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Machinery Operations in the Packard Plant*

Some of the Interesting Equipment and Methods of Manufacturing the Packard Cars—A Notable Power Plant

BY OLIVER J. ABELL

The forge shop and foundry deliver their output to the chassis department or machine shop on the same basis as would disassociated plants. In the chassis department the machine work includes the finishing of all pleasure-car chassis parts and in addition the cylinder, transmission, gear and axle machining for the trucks. The machine shop is divided into departments that are distributed through the four floors of four parallel buildings, constituting an aggregate assembly and machine shop floor space of 215,931 sq. ft. The arrangement of these departments is shown with a degree of clearness in the diagram Fig. 17, which is a cross-sectional outline of these four buildings numbered in order in the direction away from the general



Fig. 18—View Indicating the Manner in Which Most of the Courts Between the Buildings Have Been Roofed Over, the Roof Area Being Entirely of Glass

office building, which if shown would be at the right. On each floor where more than one department is conducted they are shown in the diagram as from the near end of the building to the far end reading downward. All of these buildings terminate in the long building extending at right angles as shown in the general perspective of the plant Fig. 1.

As previously mentioned and as indicated in this diagram, the machine work is divided into departments corresponding to the various parts of the car rather than to the various kinds of machine operation, except in the first building where departments are provided for finishing all the gears and for turning out all the screw machine work. In accordance with this plan of subdivision

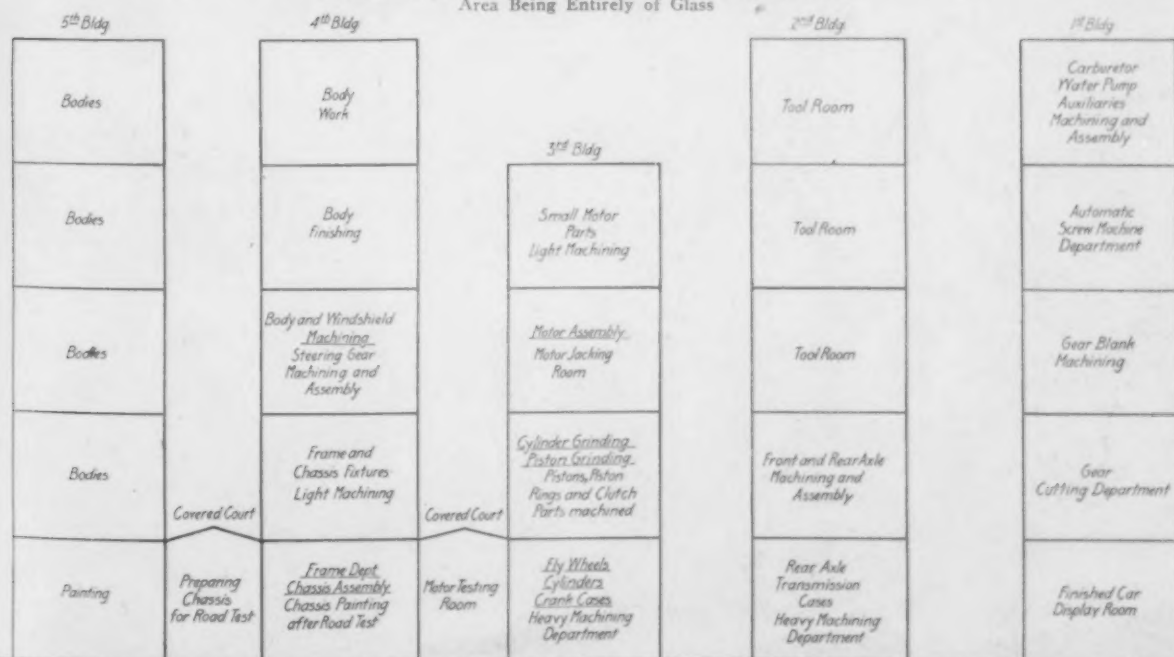


Fig. 17—Diagram Cross-Section of Machine Shop Showing Arrangement of Departments

*Continued from page 1354 of The Iron Age of June 5.

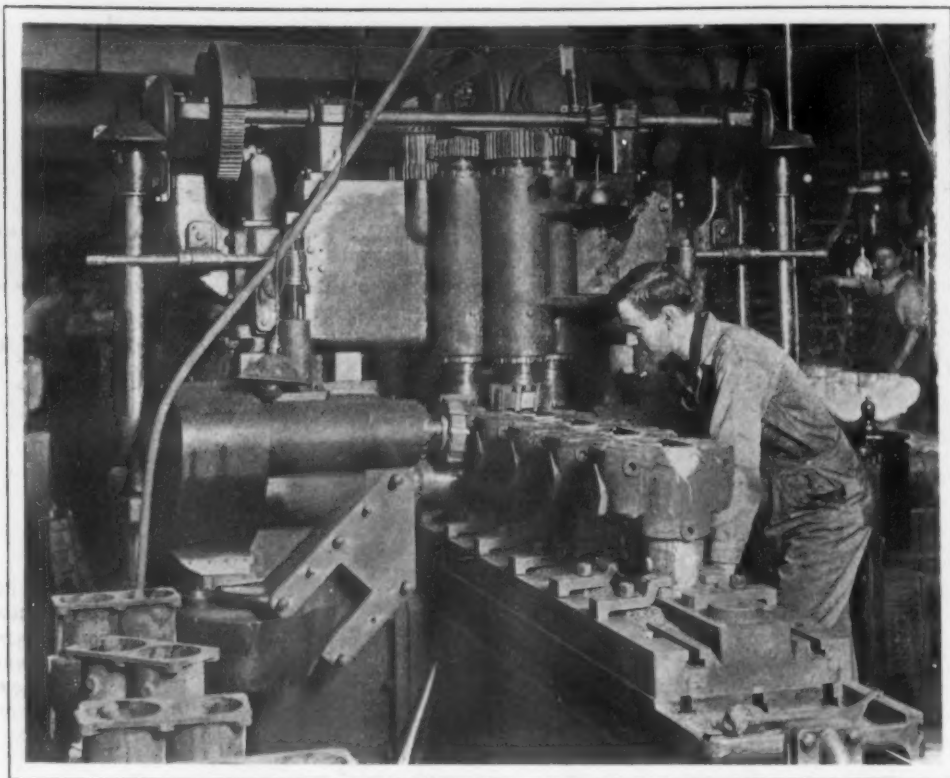


Fig. 20—View of the Cylinder Facing Job in Which Seven Cutters Operate Simultaneously on a Seven-Spindle Milling Machine Built by Beaman & Smith

the machining of any part as a cylinder, crank case or axle is practically completed in one department and when taken from there is either partially assembled or ready for assembly. This arrangement, as opposed to that which groups similar machining operations and brings all parts requiring the same operation to the machine, has been adopted as offering greater flexibility where cars of more than one model are being built and where these models change materially from year to year. It will be noted that the chassis frame and the heavier chassis parts involving the heavy machining and transportation operations are prepared for the most part in buildings Nos. 3 and 4, centering around the delivery point for the assembled chassis

ready for the road test.

In the department where the chassis is put together and fitted with the various springs and brackets, the interesting machining operation is the preliminary drilling of a side panel. The set-up for this job is illustrated in Fig. 19, this one for a pleasure car channel. In each case two American radial drills, belted for high speed drilling and placed to command the full length of the channel, drill all of the holes in each flange without resetting. The drilling is done entirely from template fixtures. The various drills required for the holes of different size are mounted in a rack in the order of their use, and immediately in front of the operator so that the time required for changing is reduced to a minimum.

In the adjoining room the motor and transmissions are brought to the assembled frame and the entire chassis is assembled. For the mounting of the road test gear an admirably adapted inclosure has been provided by roofing over the court between the two buildings as shown in Fig. 18. The roof panels are entirely of ribbed glass. A similar court inclosure between buildings Nos. 3 and 4 is used as a motor testing room. The many frame and chassis fixtures, including brackets for lamps and the control levers and quadrants, the body and wind shield fixtures and the steering gear, are completely machined and assembled in the same building. A large portion of this work is done on milling machines, the equipment including an Ingersoll

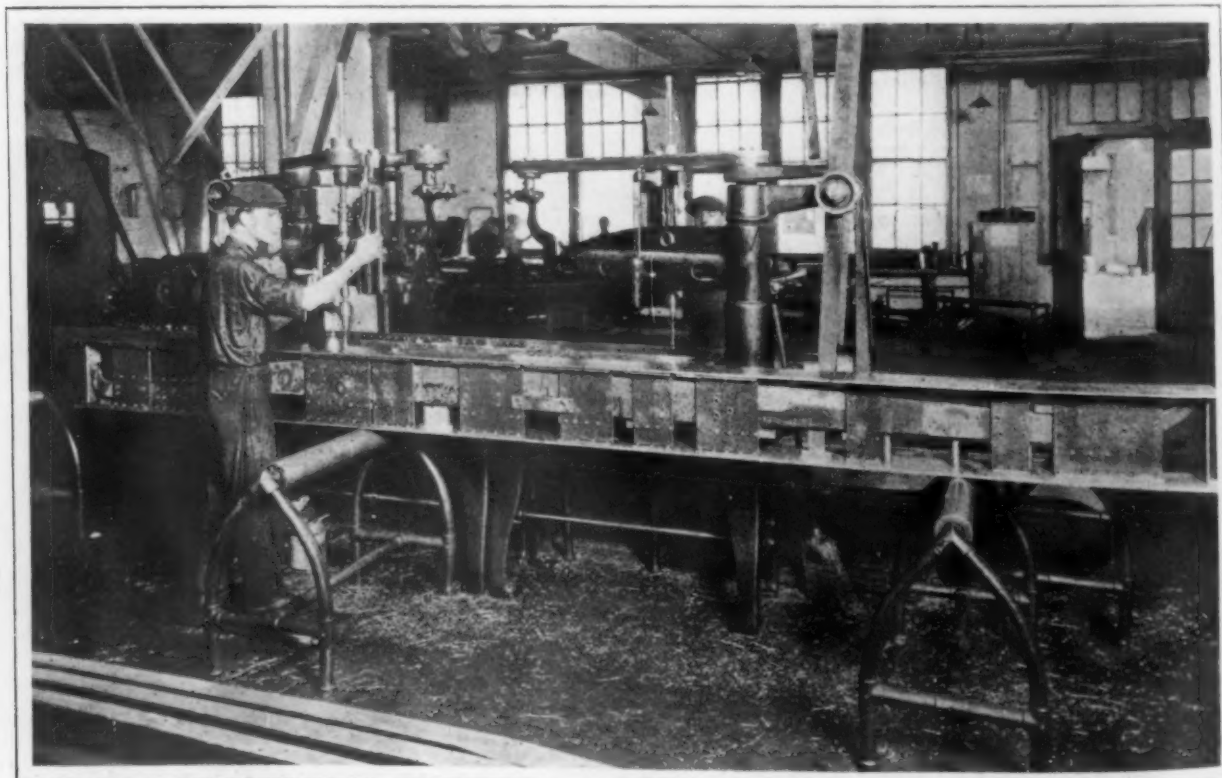


Fig. 21—View of a Planer Type Ingersoll Milling Machine Equipped with a 25-In. Cutter on the Vertical Spindle Sweeping the Bottom of Steel Horse Constructed of Pipe and Fittings Is Shown

No. 3 vertical spindle, Pratt & Whitney No. 3 vertical spindle, a No. 3 B Milwaukee, a No. 2 Garvin universal and two Brown & Sharpe machines.

It is also characteristic of this shop that while the methods of machining as displayed in a number of operations are such as to make possible a large production, the machine output is regulated by the subsequent handling and inspection processes. In Fig 20 one method of finishing the cylinders in multiple is shown. On this planer type milling machine of special design, built by Beaman & Smith, Providence, R. I., six cylinders are mounted on vertical posts that are turned to the finished size of the cylinder bore. The cylinders are thus held rigidly without vibration and in perfect alignment, while the bosses on the top and two sides are machined simultaneously. For this operation, the machine offers seven spindles, three vertical and four horizontal, two on each side.

On another special machine built by the same company eight cylinders are mounted simultaneously for the facing of the bases and the boring of the cylinders. A central four-sided horizontal rotating table is arranged with fixtures for chucking two cylinders on each side. The cylinders are finished in four stages, the first and third providing for setting cylinders preparatory to the machining operations in the second and fourth. On the first side of the machine, cylinders 1 and 2 are set up in preparation

for facing the bases; while on the second side of the machine cylinders 3 and 4 are being machined by means of a traveling head arranged with cross feed and carrying two spindles fitted with end milling cutters. At the same time on the third side of the machine, cylinders 5 and 6 are being set up for the boring operation which simultaneously is being performed on cylinders 7 and 8 on the fourth side of the machine by means of a boring head with four separate spindles. A similar machine accommodating four cylinders at one time supplements the above described machine.

Where cylinders of models other than the current year are to be finished the work is done on horizontal spindle

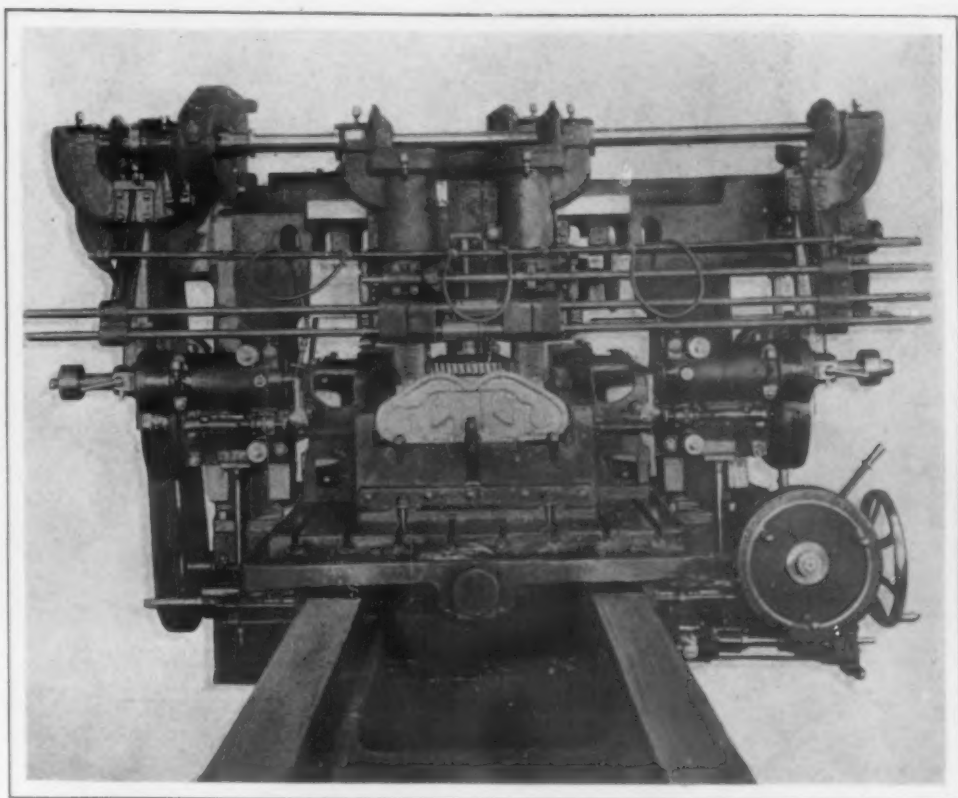


Fig. 22—Another Milling Machine Set Up in Which Three Crank Cases Are Machined Simultaneously on One Vertical and Two Horizontal Spindles

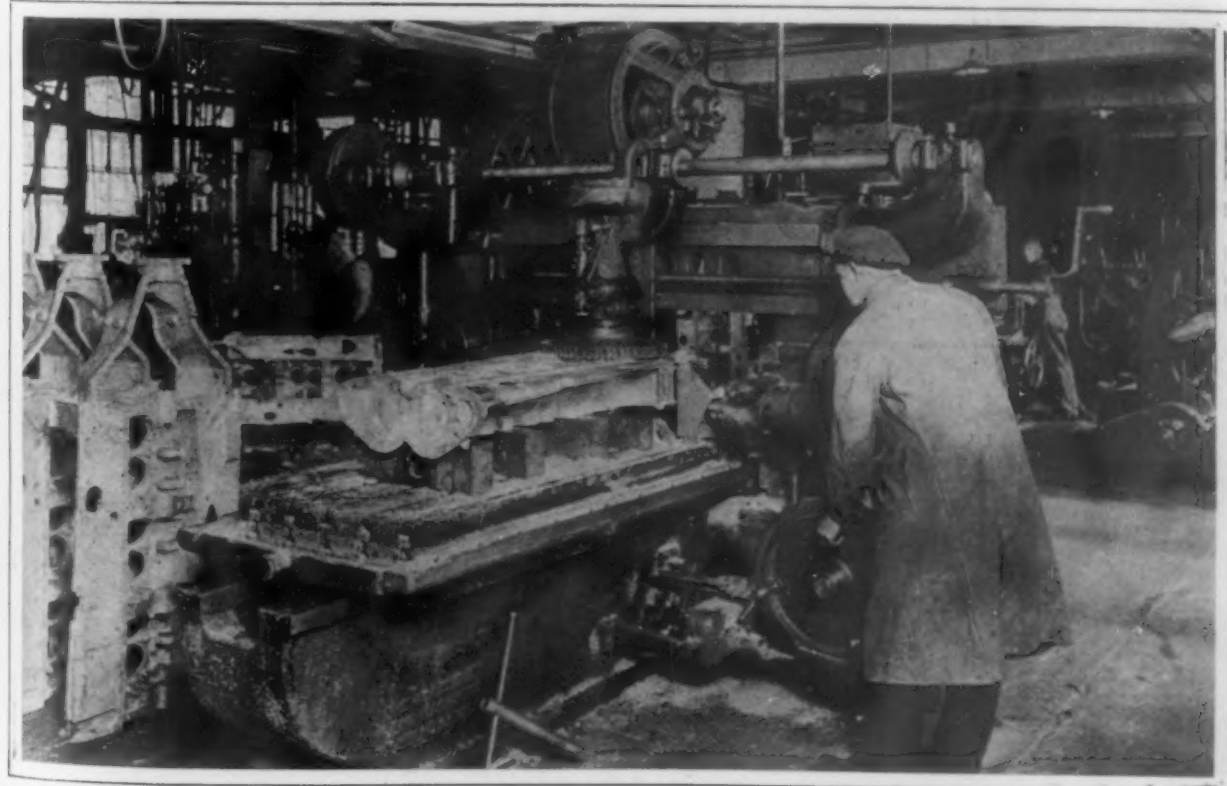


Fig. 21—View of a Planer Type of Ingersoll Milling Machine Equipped with a 25-In. Cutter on the Vertical Spindle Sweeping the Bottom Face of a Six-Cylinder Crank Case

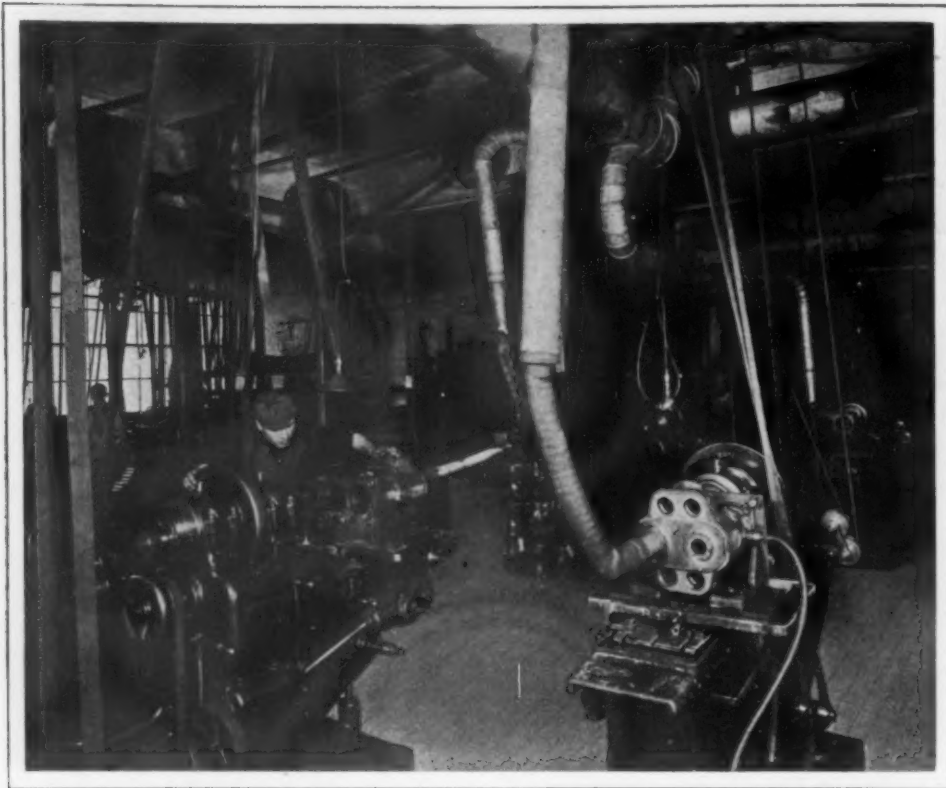


Fig. 24—Showing the Exhauster Arrangement Provided for the Cylinder Grinding Operation

milling machines, the bases being finished on one machine and the bosses on another, the latter with an end milling cutter. The machining of the flywheels is completed on two duplicate tools, the one finishing one side and the second machine completing the other face. On both sides the flywheel requires facing and turning with the roughing and finishing cut, counter boring, reaming and final finishing on the periphery. The machines are the Gisholt Machine Company's pulley turret lathe type.

There are also Ingersoll milling machines, 48 in. by 14 ft., of the planer type with seven spindles, four horizontal spindles in two heads, one each side and three vertical spindles in one head. These machines operate at cutting speeds of about 400 ft. per minute, and with a table feed of approximately 11 in. per minute. For the turning of the crank case bearings pieces are mounted in a Lucas boring machine as shown in Fig. 23. The manner of carrying the second boring bar, which, as shown, is slung overhead.

The machining of the crank cases presents some typical high-speed milling machine jobs. One of these, illustrated in Fig. 21, is done on an Ingersoll planer type machine arranged with a 25-in. cutter on a vertical spindle. In addition to the operation as shown in this setting, this machine, which is a 36-in. by 8-ft. fixed rail type having two horizontal spindles in addition to the vertical one shown, is provided with fixtures arranged to mill three cases simultaneously, as shown in Fig. 22. The time of making one pass through this machine is approximately 15 min. Some of the six-cylinder crank cases are also milled on the top side on a Beaman & Smith combination drilling, planing and milling machine, fitted with a 14-in. cutter.

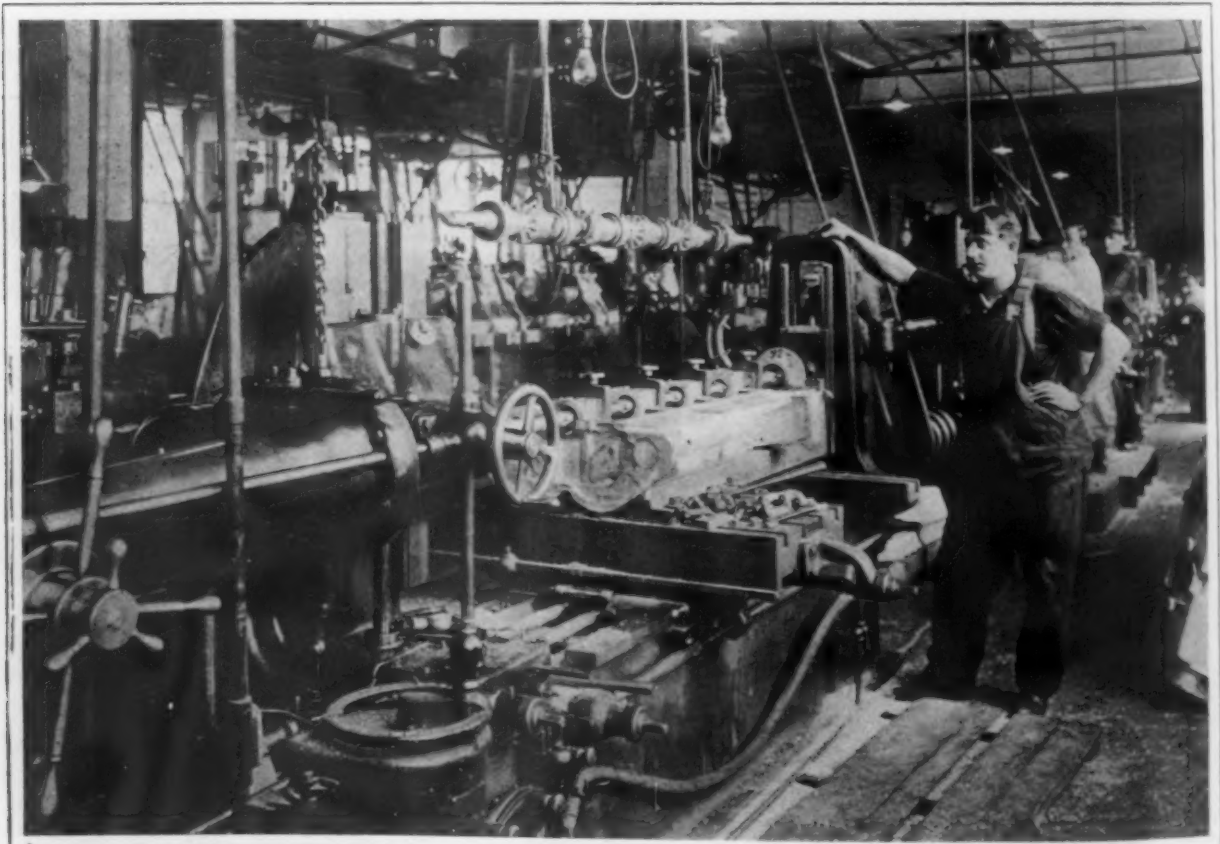


Fig. 23—Finishing the Crank Case Bearings on a Horizontal Boring Machine. The Second Cutter Bar Is Conveniently Suspended Over the Machine and Ready for Use

will be noted. The final finishing of the crank case face where the joint is made is accomplished on a Beaman & Smith combination machine fitted with a disk grinder mounted on a vertical spindle on the cross rail. For drilling the crank cases two groups of Prentice Brothers No. 6 radial machines, together with one 16-spindle, one 20-spindle and one 18-spindle Bausch Machine Tool Company's multiple drilling machines are provided.

On the floor above the piston rings and clutch parts are machined and the cylinder bore, piston and piston rings are ground. In a battery of Potter & Johnson and Gridley automatic machines the pistons are turned and the piston rings are cut from cylindrical blanks. For the grinding of cylinders and piston rings special arrangements have been devised. In Fig. 24 are shown two cylinders mounted on a Heald internal grinder. There are several of these internal eccentric grinding machines. This last view shows the manner of grinding one cylinder at a time, and also the manner of connecting up the exhaustor system for carrying off the dust developed in the operation. The equipment for grinding the faces of the piston rings is shown in Fig. 25. In Fig. 27 a novel type of exhaustor



Fig. 25—View Showing an Interesting Type of Heald Grinding Machine with Self-Contained Motor, the Grinding Disk Being Mounted on the Armature Shaft and the Operation Controlled with a Button Switch

hood has been devised for application to a Gardner disk grinder. These are used very largely for aluminum and sheet metal grinding. The pistons are ground on four Landis Tool Company machines. For the turning, grinding and slotting of the clutch parts, including the drums and rings, ten Jones & Lamson flat turret lathes, Pratt & Whitney turret lathes, Lo-Swing lathes, Pratt & Whitney vertical spindle disk grinders and Mitts & Merrill key

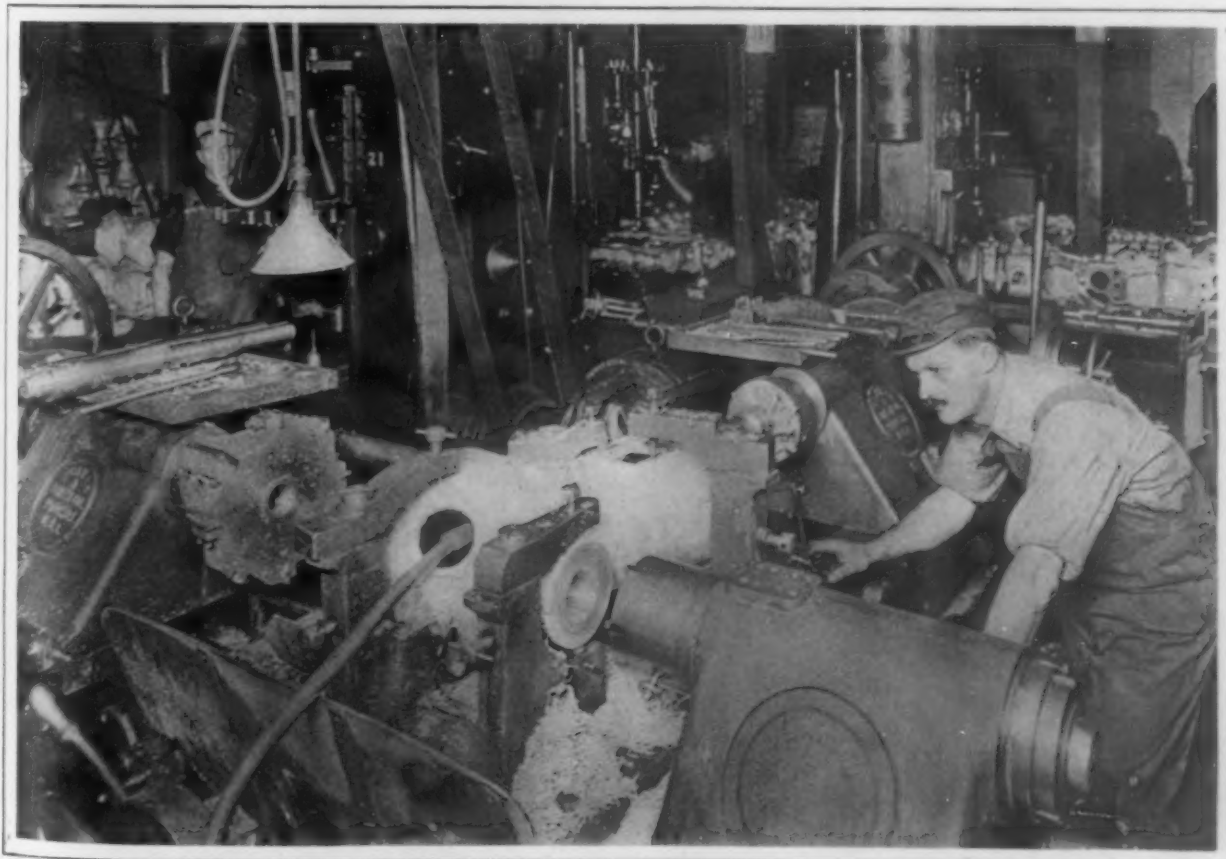


Fig. 26—The Machining of the Transmission Case Is Shown in This View on a Special Milling Machine with Three Spindles Mounted in Traveling Heads

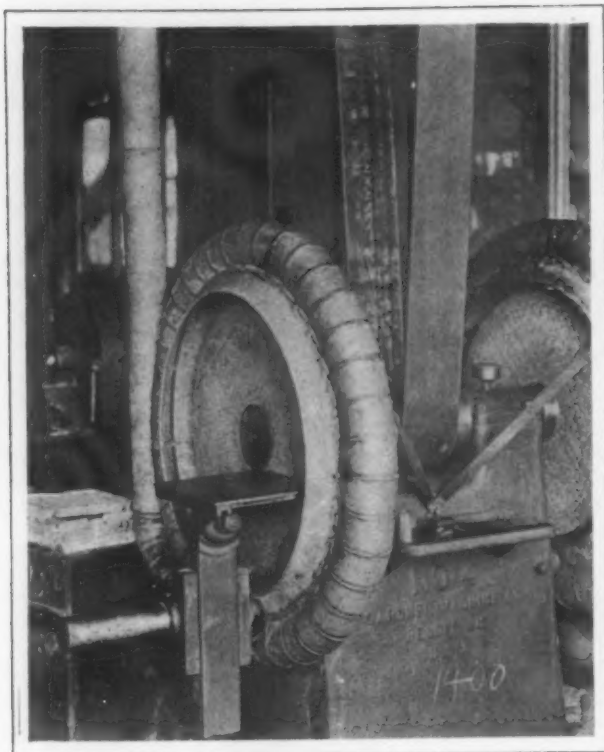


Fig. 27—Novel Arrangement of Exhaustor Hood and Pipe for a Disk Grinding Machine

seating machines are grouped in one section of the floor.

For the machining of the rear axle transmission case, a special tool has been designed by the Beaman & Smith Company, by means of which all of the operations are completed in one setting of the piece. This machine is shown in Fig. 26. In the facing of the several flanges and bearings of this case it is required that the finished faces be square with each other within 0.005 in., hence the necessity for completing this job without moving the piece. As shown in this view the operations of boring and facing the two opposed axle bearings and flanges have been completed. This is done by means of a boring bar fitted with two cutters so that both ends are machined simultaneously. The finishing cut on these faces is made with the cutters shown in the illustration. By means of the third spindle at 90 deg. an inside bearing and two faces are finished and the irregular end of the transmission case is finished from the same spindle by means of a fixture carrying a radial tube post and having sufficient cross feed to take in the entire opening.

One of the interesting examples of the departmental



Fig. 28—Boring, Facing and Turning the Back of the Blank for the Differential Bevel Gear

arrangement of manufacture in this plant is the floor on which all gear blanks are machined. Here a group of 39 F. E. Reed & Co. lathes and 12 Prentice Brothers gear head lathes are used for this purpose alone. For machining the square holes in the transmission pinion gear blanks three Lapointe broaching machines are used. This department is immediately above the floor for cutting the gears. The front gears of the motor are made of linen laminations compressed in a hydraulic press between two steel shrouds. For routing out the teeth of these gears five Schuchardt & Schütte machines are installed, and for rounding the ends of the teeth or beveling the shroud so that a noiseless operation in the gears is insured there are three Ingle tools. The front gears of the motor are hobbled on two machines of the type developed by the Lees-Bradner Company, Cleveland. The cutting of the teeth on the transmission pinions where there are two gears on one shaft and where there is no clearance permitting the cutting of the teeth on a milling machine, this job is accomplished on four 36-in. Fellowes gear shaping machines. The steering worms are formed on two Pratt & Whitney thread milling machines.

For the ordinary gear machining there are provided 28 No. 4 36-in. Brown & Sharpe gear cutting machines, six No. 4 48-in. of the same make, two Gould & Eberhardt hobbing machines, two Brown & Sharpe No. 13 and one Brown & Sharpe No. 12 milling machines. The machining of the bevel gears and pinions for the differential consists of a preliminary gashing out of the teeth on five Brown & Sharpe No. 13 geared milling machines and finishing



Fig. 29—Facing the Bevel Blank for the Large Differential Gear

generation on four Gleason machines. The sequence of operations involved in the complete machining of the large differential bevel gear is illustrated in the series of consecutive views, Figs. 28 to 32. Fig. 28 shows the machining of the back of this gear on a turret lathe; Fig. 29 the machining of the bevel face of the blank; Fig. 30 the milling operation of cutting the rough teeth in the blank, which is finished in a Gleason gear generating machine; Fig. 31 matching up the pinion and gear couple; Fig. 32 running the pinions and gear in mesh under pressure to work the teeth down to a smooth running bearing.

Immediately above the gear blank floor is the automatic screw department. An interesting variety of equipment is presented including Gridley, Cleveland, Davenport and Brown & Sharpe automatic machines. The group of Gridley machines includes two $\frac{3}{4}$ -in. four-spindle machines, three $1\frac{1}{4}$ -in. and one $2\frac{1}{4}$ -in. and one single spindle $2\frac{1}{4}$ -in. machine. There are three $3\frac{1}{4}$ -in., three $1\frac{1}{4}$ -in., one $1\frac{3}{8}$ -in., one $\frac{3}{8}$ -in. and one $\frac{5}{16}$ -in. Cleveland and two Davenport machines taking work up to $1\frac{3}{8}$ -in. round stock. The Brown & Sharpe equipment includes 28 No. 0 machines handling up to $\frac{5}{8}$ -in. round and 30 No. 2, handling up to $1\frac{1}{4}$ -in. round. The large automatic ma-

chines make studs and cap bolts in a variety of sizes and on the larger Gridley machines the cross-head pin in the pistons are made, $4\frac{1}{4}$ in. long and $1\frac{1}{4}$ -in. outside diameter for one model and $4\frac{3}{4}$ in. long by $1\frac{1}{2}$ -in. outside diameter for another model.

The one characteristic which predominates above all others in every department of the machine shop is the rigidity with which every finished part is tested and inspected during the process of manufacture. Illustrative of these methods is the view shown in Fig. 36, where an entire department is devoted to the inspection of parts with test gauges. Between each machining operation when the operator turns in his material and time on the job, the material passes through the hands of an inspector before it moves on again either to the next machining operation or to an assembly. Fig. 33 is a portion of the receiving room for incoming castings and forgings each of which is inspected, and Fig. 34 shows a typical lot of material which has been found unsatisfactory at some stage in the manufacturing process. One of the standards to which the assembly work must conform is illustrated in Fig. 35, which shows the truing up of the piston in the process of assembling the motor. Each piston must square up with the gauge as shown. A general view of the motor assembly room, in the foreground of which this lining up of the piston is shown, is presented in Fig. 37. In this illustration the frame in which the motor is mounted for assembling will also be noted. This permits the motor being rotated to the angle most convenient for assembling any particular parts.

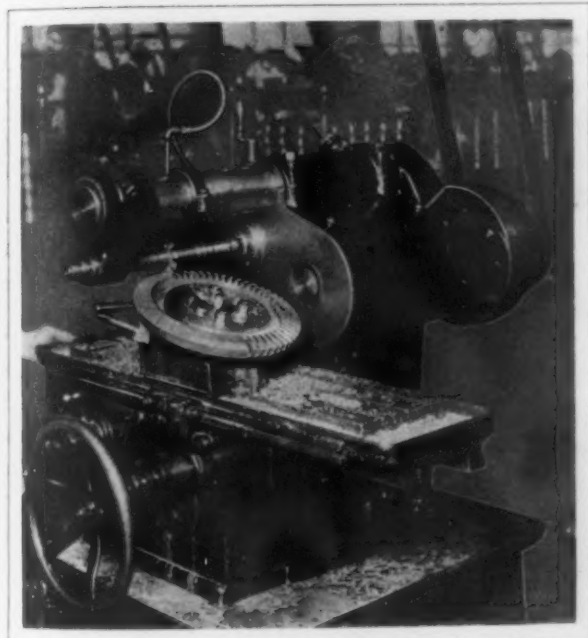


Fig. 30—Cutting the Teeth in the Differential Bevel Gear Blank on a Horizontal Spindle Milling Machine

In the lighter machining departments where the frame and chassis fixtures are finished and in the department where the steering gear parts are machined and assembled, most of the operations are adapted to the turret lathe, milling machine and upright drilling machine. In one of these departments the equipment is almost exclusively made up of milling machines, including eight No. 2 B heavy duty machines spaced in rows approximately 12 ft. apart with the machines from 7 to 10 ft. apart, five No. 3 vertical spindle and six No. 3 B heavy duty, all Brown & Sharpe machines. On a number of these machines the cutters are made in special forms, as for example the convex cutter for milling the teeth in the quadrant for the control levers. The turret lathes on which such parts as the lamp and dash-board brackets, steering gear parts and windshield brackets are turned include Jones & Lamson, Pratt & Whitney and Warner & Swasey machines. The brake drums for the rear axle are bored on Gisholt turrets and the brake bands are turned on a Libby turret lathe.

As indicated previously a large part of the machine work



Fig. 31—Matching the Differential Pinion and Gear

for the trucks is done in conjunction with the pleasure-car machining. The building which houses the truck department, in contrast to the chassis department above described, provides a continuous floor space on which the fabricating of the frames, the heavy machining and the assembly of the chassis and body are conducted. The machining on this floor consists of the turning of the rear axle brake drums and the drive sprockets for which 13 Bullard vertical turret lathes are provided. The cutting of the sprocket teeth is accomplished on two No. 6 60-in., one No. 5 60-in. and one No. 4 36-in. Brown & Sharpe gear cutting milling machines.

Power throughout the plant is generally distributed by group drive from motors on a 250-volt circuit. The main leads to the various divisions are carried through a large tunnel 8 ft. wide by 9 ft. high, an interesting interior view of which is shown in Fig. 39. This tunnel runs from the power house to each of the buildings in the main



Fig. 32—Running the Differential Pinion and Gear Under Pressure to Establish a Smooth Running Relation



Fig. 33—One of the Inspections to Which Incoming Material Is Subjected

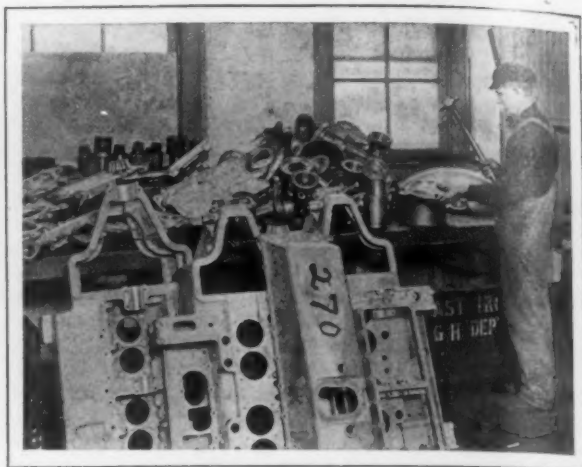


Fig. 34—An Example Indicating the Extent to Which Parts Failing to Meet the Rigid Inspection Are Condemned

group, carrying as shown both the power and lighting cables and the steam and water piping. The power generating station comprises a steam plant with 250 hp. Wickes vertical boilers equipped with Murphy stokers supplying steam to Corliss compound engines driving generators direct connected. An interior view of the main floor of the engine room of the power

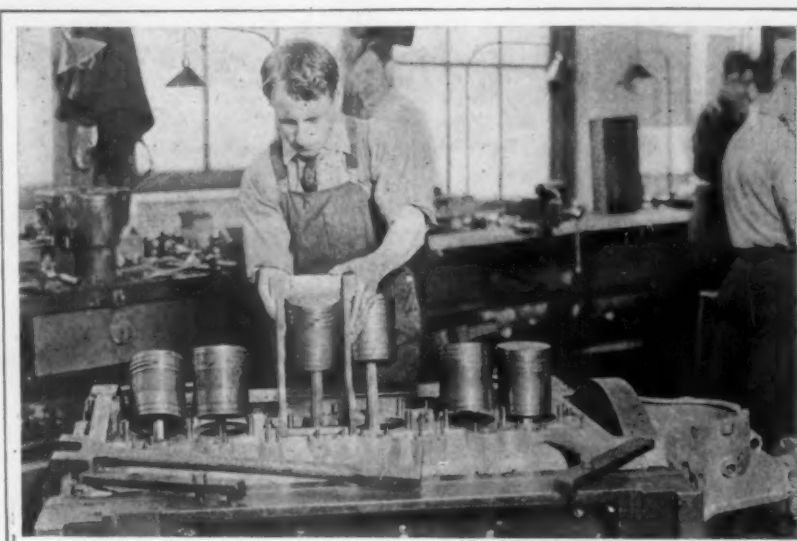


Fig. 35—The Alignment of Each Piston Is Adjusted During the Process of Motor Assembly by Gauge in the Manner Indicated

house and the well for the auxiliary pumps and condensers is shown in Fig. 38. The generating units consist of one cross-compound Wisconsin Corliss engine with cylinders 26 and 46 x 48 in. driving a 1000-kw. Western Electric generator, delivering current at 250 volts, and two C. & G. Cooper cross-compound Corliss engines with cylinders 38 and 72 x 32 in. driv-



Fig. 36—View of a Department Devoted to Accurate Inspection by Gauge of Machined Parts

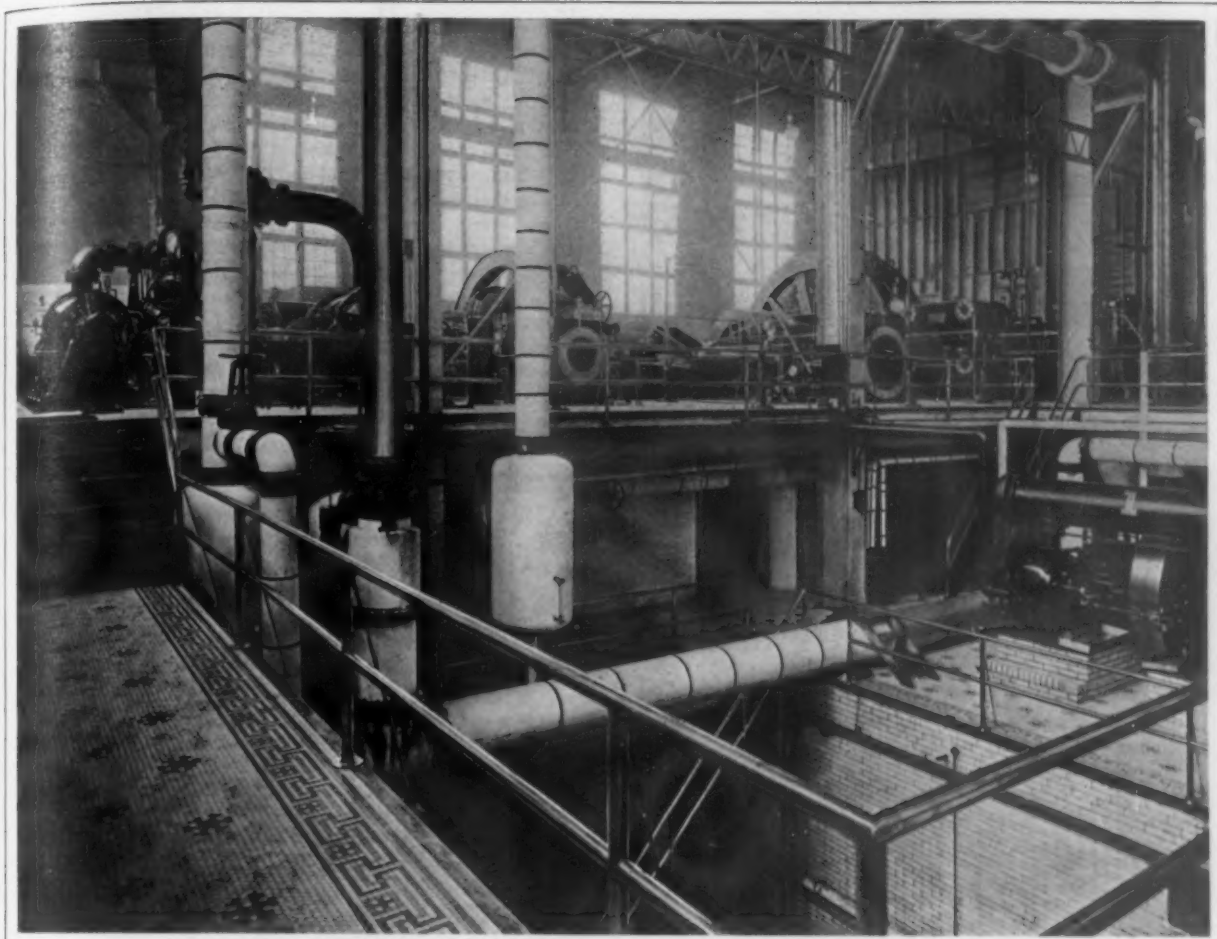


Fig. 38—Interior of the Power House Showing the Generating Units on the Main Floor and the Auxiliary Pump Well in the Foreground

ing 2000-kw. generators. A 300-kw. high-speed Ball engine driving a Western Electric generator produces current for the lighting circuit. Air is compressed by means of a cross-compound Hamilton Corliss engine with steam ends 20 and 32 x 42 in. built by the Hooven-Owens-Rentschler

Company connected up with Ingersoll-Rand air cylinders 19 $\frac{1}{4}$ and 32 $\frac{1}{4}$ x 42 in.

The arrangement for handling coal provides a track pit from which the coal is elevated into a large storage shed removed from the boiler house. From this shed the coal



Fig. 37—The Motor Assembly Room



Fig. 39—View in the Tunnel Which Connects the Power House with All of the Plant Buildings

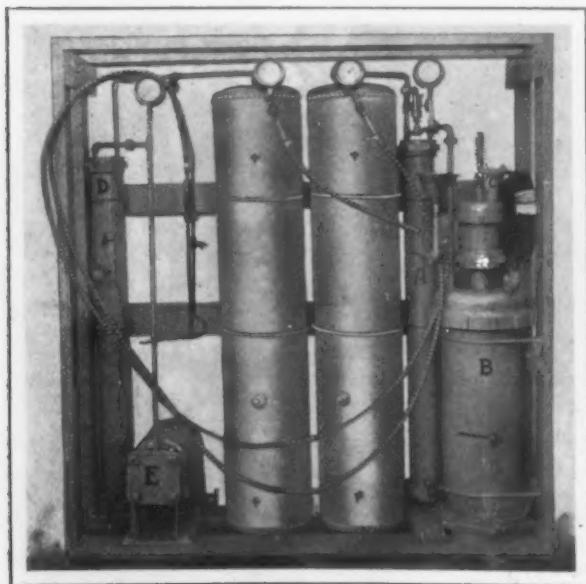
is delivered by conveyor into the overhead hoppers hung above the boiler front and from which the coal is spouted down into the stoker hoppers. The ash drops from the stoker into a tunnel below and is wheeled out.

(To be continued.)

A Compact Autogenous Welding Outfit

A compact, self-contained oxy-acetylene outfit for welding and cutting has been placed on the market by George C. Schemmel, Wapakoneta, Ohio. It is furnished complete with gas generators, welding and cutting torches, etc., and occupies a small amount of space. In the design of the machine air and mixing valves, air pumps and pressure regulators have been eliminated, with the idea of making it easy to operate, even by a novice. Another advantage claimed for the outfit is that the peculiar construction of the torch enables the operator to work with a very low pressure.

The equipment illustrated has two 60-gal. storage tanks, which have been tested to a pressure of 200 lb. per sq. in. The acetylene gas generator B has a storage tank which holds the carbide mounted on top of it. The carbide is fed



An Improved Type of Self-Contained Oxy-Acetylene Outfit for Cutting and Welding

into the storage tank by removing the cap C, and from there is automatically fed into the generator, the rate being regulated by the hand plunger at the top of the generator in accordance with the demand. From the generator, the gas passes through the gas scrubber A and then to the storage tank at the right. The oxygen is generated at E, passes into the scrubber D and then into the left of the two central tanks. Safety valves are provided on both scrubbers to prevent the presence of excessive pressures in the tanks. Pressure gauges are mounted on the discharge pipes from both generators as well as on the storage tanks, the purpose being to prevent the operator from opening the valves on the discharge pipes before the pressure in the generators is above that in the tanks.

The torch is designed for both welding and cutting use. Armored hose from the two storage tanks conducts the different gases to the torch, where a mixing chamber is provided. Besides being designed for low pressure, the torch is arranged so that it may be held in place and the flame regulated with one hand while the other one is left free to hold light work in place when this is necessary.

Several sizes of welding outfit are made. The smallest one has storage tanks of 30-gal. capacity, while the largest has two 20-gal. tanks.

New Type of Safety Guard for Punch Presses

As a result of an investigation made by the Hardware Supply Company, Grand Rapids, Mich., into the question of safety devices for punch presses for use in its own factory, an improved form of guard has been placed on the market. One of the particular advantages claimed for the guard is that it can be placed in any ordinary punch press in less than 5 min. without any machine work whatever. The bolt on the right side of the press, which



An Improved Form of Safety Guard for Punch Presses

holds down the bolster plate, fastens the guard, and it can be removed or adjusted in a very short space of time.

As will be noticed from the accompanying illustration, there is an angle plate with a slotted arm, which slides under the bolt fastening the bolster plate in place as mentioned. To this angle plate is bolted a plate having a slot for adjustment and supporting the rocking bar to which the guard is fastened. At the opposite end of the rocking bar there is a chain fastened, the lower end of which is attached to the treadle, and at the end to which the guide bar is attached there is a coil spring of piano wire which carries the guard back to place when the treadle is released.

When the treadle is pressed downward, the chain pulls on the forward end of the rocking bar and this throws the guard bar upward and forward, forcing the operator's hands away from the dies. If the hands are resting upon the guard bar with sufficient weight to keep it down, the press cannot be tripped, it being necessary for the bar to be thrown upward before the trip will operate. In this way, it is emphasized, an efficient protection against injury to the hands is secured by the guard, which at the same time is not in the way, nor is it any hindrance or annoyance to the workman.

Exhaust Turbines in Disston Plant

Utilization of Exhaust Steam in Disston Saw, Tool and File Works

A new power plant has been built for Henry Disston & Sons, Philadelphia, equipped with mixed-pressure steam turbines for utilizing the exhaust from rolling mill engines and steam hammers. The plant has been built to provide additional power required, as well as to secure a more economical and convenient arrangement. In the Disston works, which makes saws, tools, files and other steel products, there are located at different points twenty-three steam engines, having a total capacity of 9000 hp. From 13 of these scattered engines and 6 large steam hammers, the hitherto unused exhaust steam, corresponding to 4000 boiler horse power, is now collected and carried through a system of covered pipes, running overhead from building to building, to a central point where the power plant has been erected. There are no less than 3 miles of this piping of a diameter ranging from 8 in. at the most distant points to two 24-in. pipes, which deliver to a steam separator for eliminating oil and water. From the separator the steam is carried to a header, from which the turbines get their supply.

The power house is 28 x 92 ft. in ground plan, and two stories high. The proportions of the interior of the building partake somewhat of those common to power stations for public service corporations, in that the ceil-

The turbines, generators, vacuum pumps, exciting units and switchboard are located on the upper floor of the power house, leaving the condensers, circulating pumps and generator air cooling systems for the lower floor. There are three mixed-pressure Curtis steam turbines, each directly connected to a 1250-kw. General Electric generator. Two of them are as a rule in operation, leaving one in reserve. One of the exciter units, driven by a direct-connected live-steam turbine, is shown in the foreground. The vacuum pumps are designed to maintain 28½ in. vacuum on the condensers. The condensers are of the surface type, containing brass tubing. A 20-ton Niles electric traveling crane spans the power house overhead, in the second story, as indicated in the accompanying illustration, and also a distance of about 25 ft. outside of the building over a railroad spur, giving facilities for unloading and loading heavy machinery on cars. In addition to furnishing current for general electric lighting around the plant, there are about 114 motors from 2 to 500 hp. each, totaling 2500 hp., supplied by the power plant.

Open-Hearth Mechanical Draft Now Chimney

Mention was made in *The Iron Age*, September 26, 1912, of the pulling down of the open-hearth furnace stack at the plant of the Ohio Steel Foundry Company, Lima, Ohio, by the boom of a locomotive crane running into the guy



Mixed-Pressure Turbine Power Plant of Henry Disston & Sons, Showing Turbine-Driven Exciter in Foreground

ings are lofty, making the building substantially equivalent to a four-story structure. The power plant is located at the Delaware River end of the steel works, affording a favorable location for the collection of steam and the distribution of power, and also giving accessibility to water for condensing purposes. In short, a continuous supply of cold water is available only a few feet from the building, from a river 20 to 30 feet deep and a mile wide. Eight of the engines supplying the steam, ranging from 200 to 1000 hp. capacity each, are concentrated in two buildings for driving the rolling mills.

wire attached to the stack. The furnace was afterward operated by a mechanical draft supplied by an 80-in. exhaust fan. Views of this furnace, which was probably the first one ever operated by a mechanical draft, were given, and the exhauster supplied the blast satisfactorily for a period of four and one-half months. A concrete chimney 129 ft. high has been erected to take the place of the old stack, which was only 115 ft. in height and had an inside diameter of 50 in. The diameter of the new stack is 81½ in. at the bottom and 51 in. at the top, the outside diameters being 100 and 58 in., respectively.

Manufacture and Uses of Malleable Cast Iron*

The Proper Annealing of Heavy Sections— Need of Co-operation With the Foundry in Pattern Design—Automobile Specifications

BY ENRIQUE TOUCEDA

Although malleable cast iron, as compared with steel, enters into automobile construction to a limited extent only, the actual amount used in the industry is large. I believe it will be admitted as a general proposition that the constructing engineer, while thoroughly posted on carbon and alloy steels, knows less about this material than possibly any other passing through his hands. There is a widely prevalent misconception that when any part of a malleable casting exceeds $\frac{3}{8}$ in. in thickness of section, the change that normally takes place during the annealing process, whereby the hard and brittle white iron castings that come from the air furnace are converted into soft, tough and ductile ones, is but imperfectly accomplished.

The Process

The malleable iron process is conducted in two steps, the first of which consists of melting gray pig iron upon the hearth of an air furnace, when a certain amount of the original silicon, carbon and manganese is oxidized, and thus removed from the iron while it is being melted and subsequently raised high enough in temperature to run the castings successfully. The following three facts are well known to those who possess even an elementary knowledge of the metallurgy of iron and steel:

1. Most of the carbon content of gray pig iron exists in the form of graphite; that is, free. If a pig be broken and the fractured end be gone over with a stiff brush, it is easy thus to remove the exposed little flakes of graphite held in mechanical mixture with the iron and always separated from the iron during and for an interval after solidification.

2. When pig iron is uniformly white in fracture, no graphite is apparent upon inspection; instead of the carbon separating out in whole or in part as graphite, it is all combined with the iron chemically.

3. A pig iron having most of its carbon in the form of

graphite can be changed into an iron in which none of its carbon will separate out as graphite if this pig iron be melted in such a manner that a certain amount of its silicon content be removed from it through oxidation; for if the silicon content is in excess of a certain amount, it prevents the carbon from combining chemically with the iron, while if it be removed gradually from a pig iron in which the carbon would normally have existed as graphite, a point will finally be reached at which its influence in forcing the carbon to separate out as graphite will cease.

Removal of Silicon

It is an easy matter, then, to start with pig iron that is gray in fracture and in which all or most of the carbon exists as plates of free graphite, and end with an iron that is white in fracture and in which all of the carbon is combined chemically with the iron. It is a question solely of getting rid, in the air furnace, of such an amount of silicon as will accomplish this end. It thus becomes obvious that the manufacturer of malleable iron castings, by means of his air furnace, experiences no difficulty whatever in converting gray pig iron into white cast iron; which operation constitutes essentially the first step of the process. Many years ago it was discovered that if hard, brittle white iron were surrounded tightly by an oxidizing packing, such as iron oxide in any form, and then raised to and maintained at a temperature of about 1500 deg. Fahr. for a few days, it would not only be changed into very soft and ductile iron, but some of its carbon would be removed during the interval. This constitutes the second step in the malleable iron process. Consequently, the first step toward getting soft and ductile castings in the malle-

able iron process, is to get hard and brittle castings, in which all of the carbon is combined chemically with the iron as carbide of iron, the hardest constituent in either iron or steel. The second step is to break up

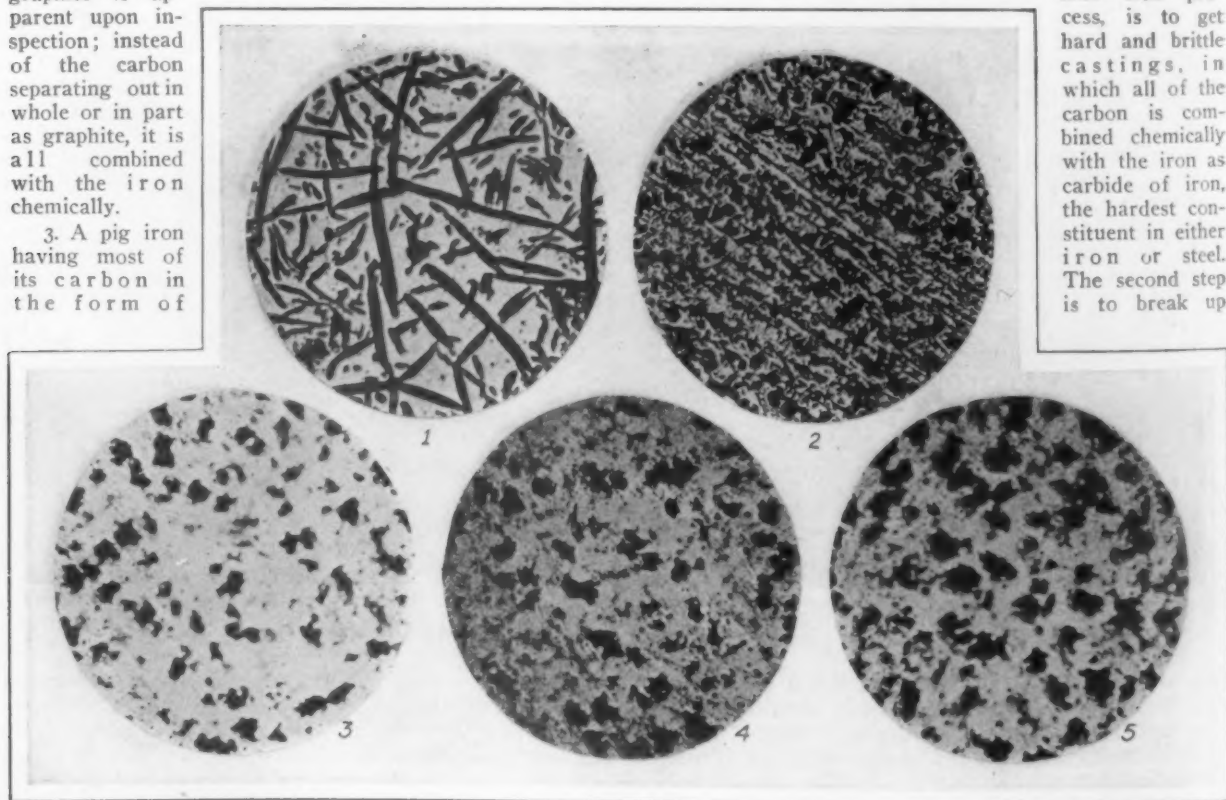


Fig. 1—Photomicrograph of Polished, Unetched Section of Gray Pig Iron. Fig. 2—Polished Section of White Iron. Fig. 3—Annealed Malleable $\frac{3}{8}$ in. from Surface. Fig. 4—Annealed Malleable Between Surface and Center. Fig. 5—Annealed Malleable at Center of Bar

*A paper read at the Summer Meeting of the Society of Automobile Engineers, Detroit, Mich., June 5, 1913.

carbide of iron into carbonless iron and free carbon, both of them soft. By the aid of photomicrographs, what

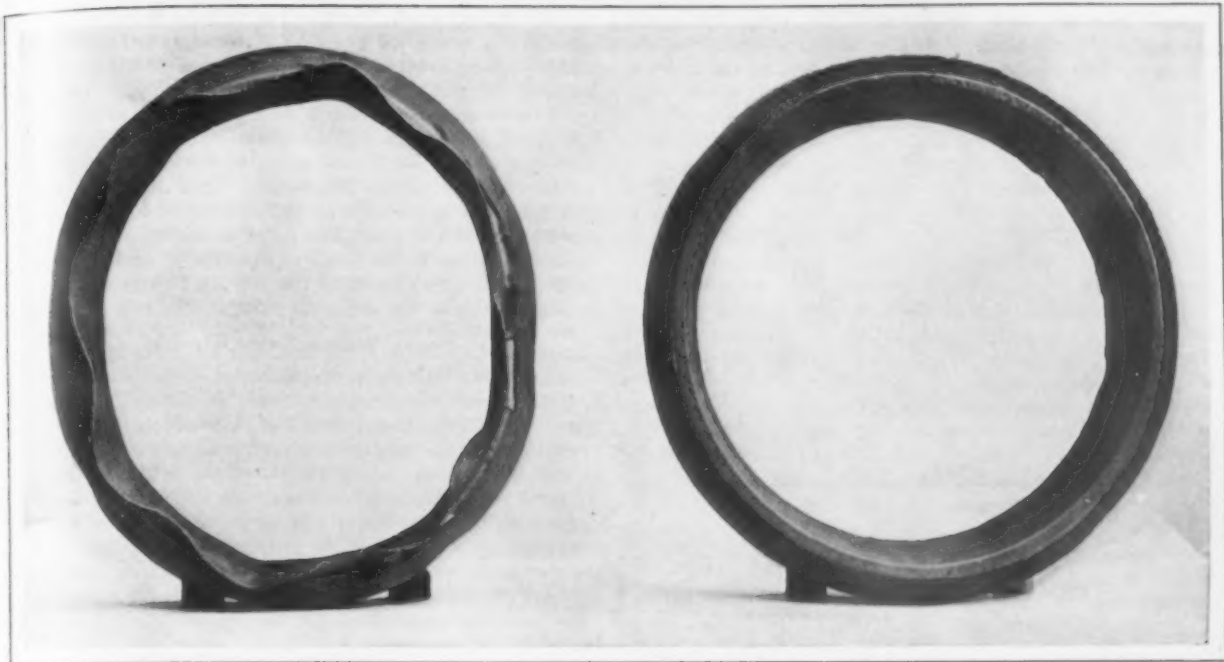


Fig. 6—Malleable Automobile Clutch Ring Machined from 7/16 In. to 1/4 In., Subjected to Heavy Blows to Test Ductility and Strength of Core

takes place during the second step of the process, that is, in the annealing ovens where the white and brittle castings are placed to be converted by time and temperature into finished castings, will be explained in a non-technical manner.

Changes in Carbon States

Fig. 1 illustrates a polished, unetched section of a piece of gray pig iron, the object of which is to show the plates or flakes of graphite that separate from the metallic iron, when the silicon is sufficiently high in the iron to force the carbon thus to separate. It will be noticed that there is practically no regularity of either size or distribution of these flakes; therefore it is not to be wondered at that cast iron test bars show great irregularity in strength, even when poured from the same ladle of iron.

Fig. 2 shows a polished section of white iron, white because its silicon content was too low to force any of its carbon to separate out as graphite. The whole of the carbon consequently remains chemically combined with the metallic iron, invariably in the proportion of 6.67 per cent. carbon to 93.33 per cent. iron. This extremely hard carbide of iron is shown mostly in the white areas, but about 12 per cent. of the dark areas consists of this hard constituent also, the reason for which it is not necessary to consider for the purpose of this article.

As previously stated, carbide of iron is the hardest constituent that can exist in either pig iron or steel, but fortunately, as already indicated, it has been discovered that if it be heated to about 1500 deg. Fahr. for many hours, it can be split into little nodules of free carbon and a mass of practically pure iron, the former being very soft and having no strength, and the latter being both soft and ductile and possessing high strength. An inspection of the polished sections of annealed malleable iron, Figs. 3, 4 and 5, will show that these little nodules of free carbon (the little black areas in the photomicrographs) are uniformly distributed throughout the entire section and are uniform in size, differing in both particulars from the manner in which the graphite occurs in gray iron.

Uniformity of Heat in Annealing

To contend that white iron castings over 3/4 inch in section cannot be annealed as efficiently as castings of less thickness, is to contend that a piece of white iron over 3/4 in. in section cannot be heated uniformly throughout its entire section to a temperature of 1500 deg. F. or over. This is manifestly absurd, for it must be admitted that in many different processes ponderous pieces of steel are being heated daily throughout their mass to any required temperature. The sole precaution in any case is to see that plenty of time be given the operation. As it happens that in the annealing process in the manufacture of malleable

iron castings, some seven days are consumed from the time the castings enter the ovens until they are withdrawn, if the breaking up of the hard carbide is not complete in the case of thick sections, this is certainly not due to lack of time to allow the piece to heat uniformly throughout. Moreover, there is no trouble whatever in maintaining the temperature of the ovens at any point under 1900 deg. Fahr.

Thickness of Section

The direct question can now be put, What is the limit of thickness of section beyond which white iron will not be efficiently and completely annealed; that is, not have all of the hard constituent completely replaced by little nodules of free carbon and practically pure iron? The answer is plain. Any thickness of white iron can be thoroughly and uniformly annealed throughout; and in

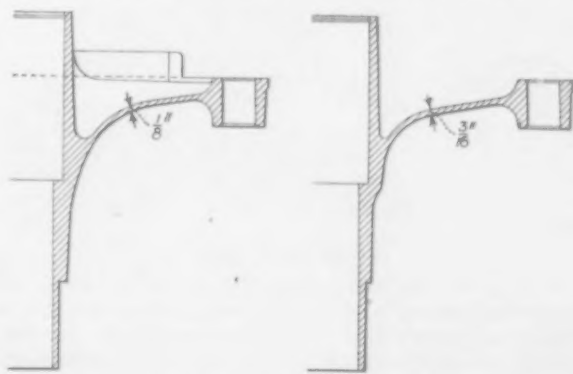


Fig. 7—Original and Changed Pattern for Malleable Casting

that state have the whole of its carbon content as carbide of iron. It has been shown that whether the carbon exists as carbide or as graphite, it is simply a matter of how low or how high the silicon may be in the casting. It has also been shown that the adjustment of the silicon is under the complete control of the manufacturer. If the silicon is as low as 0.30 per cent. it is possible to obtain easily sections as thick as 6 in., in which all of the carbon will exist as carbide of iron, although in this extreme case to break up all of the carbide and completely replace it with free carbon and iron, a higher temperature than that normally used during the anneal is required. In sections 3 in. thick all the carbon will exist as carbide of iron when the silicon is around 0.50 per cent., in which event neither a higher temperature nor a longer anneal than is customary in ordinary practice will be required. I have therefore placed this as the limit of thickness for

efficient and complete annealing. The trade, however, does not call for malleable iron in which the sections are so heavy. The statement can be made that if the process

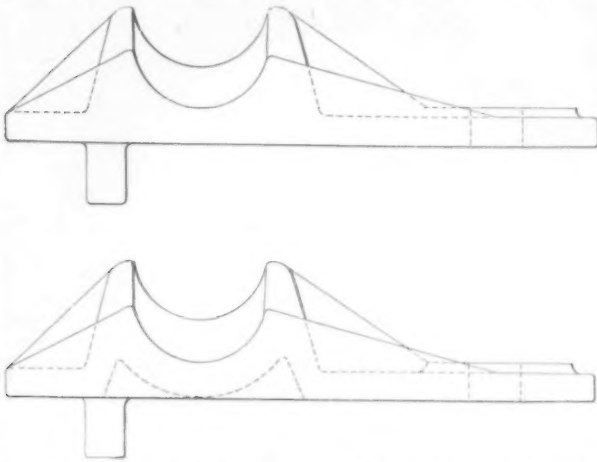


Fig. 8—Original (Upper) and Changed Pattern, Which Reduced the Amount of Metal in the Casting

is fully understood by the manufacturer, and he will adjust the silicon content in accordance with the heaviness of the work, no trouble from this source should exist and none ever will.

Referring again to Figs. 3, 4 and 5, these photomicrographs were taken from an annealed malleable section 2 in. in diameter and several inches in length. The sample was cast at my request from a heat in the regular course of the work. While the company makes fairly heavy castings, none of the parts approaches this sample in thickness. Still, as will be seen, the silicon in this company's white iron was low enough to cause all of the carbon to form carbide of iron in a 2-in. round. This sample was annealed in the oven with the company's other castings, in exact accordance with the regular practice of the shop. Fig. 3 was photographed at a spot about $\frac{1}{8}$ in. from the surface; Fig. 4 at a spot midway between the surface and the center; and Fig. 5 directly at the center. A close inspection and comparison of these three illustrations should satisfy the most skeptical that this piece was annealed throughout, and that all of the hard carbide was broken up into free carbon and soft iron. Accompanying this sample was another, 4-in. in diameter, the central part of which I found contained considerable graphite in the form of flakes, which from their shape could be identified as having resulted from the separation of some of the carbon during the solidification of the white iron, showing that in this case the silicon in the normal mixture was not sufficiently low to have forced all of the carbon to combine with the iron, although had the silicon been somewhat lower, there should have been no difficulty in this particular.

Removing the Skin

It is often said that if the skin of a malleable iron casting be removed and the core tested the latter will be found to be more or less worthless, and that malleable castings are strong and ductile by virtue principally of the metal in the skin. There is no question whatever that the metal in the skin of well-made malleable cast iron is slightly superior to that which constitutes the main bulk of the casting, but only in the case of poor malleable cast iron can a really great difference in strength between skin and core be noted. The poorer the malleable the more pronounced this difference. Malleable castings are not unique in this particular, for the metal in the skin of most steel castings is stronger than the central part of the casting, although not for the same reason that obtains in the case of malleable cast iron. The skin of malleable castings is practically decarbonized iron, the structure being uninterrupted by the presence of any little nodules of free carbon. The structure of the core, however, differs from that of the skin only in that throughout it little nodules of free carbon are interspersed. That in good malleable iron these little particles of free carbon do not act in a way to injure the structure to any appreciable extent, I have satisfied myself by numerous tests from time to time. To illustrate this fact, I have secured castings of an automobile

clutch ring, shown in Fig. 6. The $\frac{7}{16}$ -in. thick rim of the casting was machined down to a thickness of $\frac{1}{8}$ in., after which it was subjected to repeated heavy blows with a hammer to test the ductility and strength of the core left after machining. It will be seen that the metal of the core in this instance was of great strength and ductility and was able to withstand great punishment without developing cracks of any magnitude. It is most likely true that the metal in the skin of this casting was slightly superior to that in the core; but I feel confident that the difference was not great, and I repeat that in good malleable castings, while the metal in the skin is a little superior to that of the core, the difference is but slight.

Faulty Patterns Cause Trouble

Some manufacturers of malleable cast iron have not kept pace with the advances made in malleable practice; some do not even understand the rationale of the process, or lack of good manufacturing equipment; and while, fortunately, these do not predominate, there are enough of them in existence to throw much undeserved discredit on one of our important and growing industries. I am convinced, however, that the constructing engineer, owing to improperly designed patterns, has contributed unintentionally in numerous instances to this situation. The worst offenders in this particular, however, are the engineers for the railroad car builders.

If the question of shrinkage and contraction be not properly considered, if the apportioning of thick to thin sections be not adjusted in accordance with correct principles, no matter how superior may be the metal per se, failure is the certain outcome. The remedy should be obvious. Practically all of the makers of malleable castings have on their staffs men who are proficient in the design of patterns from which to cast malleable. Much delay, much irritation, and a great deal of injustice will be eliminated, and a much stronger casting for the same weight of metal will often be produced, when closer re-

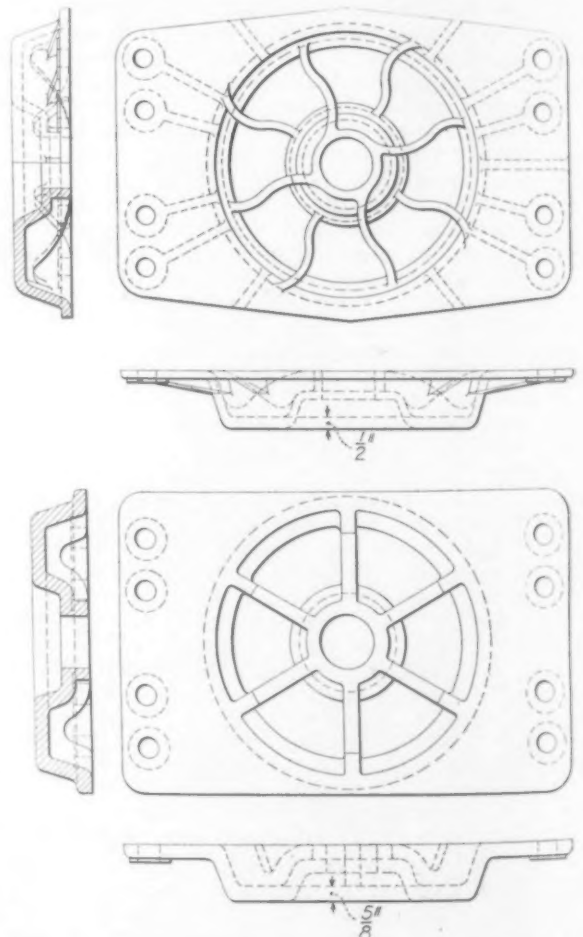


Fig. 9—Pattern for Malleable Casting (Upper) and How It Was Changed When Made in a Steel Foundry

lationship and co-operation exist between the engineer who designs a malleable part of any particular machine and the malleable patternmaker at the foundry. Lack of

time has prevented my securing more glowing examples than the ones here shown, of how small need be the alteration in a pattern, in many instances, to produce good results where bad ones previously obtained. The changes shown in Fig. 7, although very slight indeed, made the difference between success and failure. The same remark holds good in the case of Fig. 8, the change producing not only a satisfactory casting but one containing less metal. In connection with the center plate shown in Fig. 9, the following are the facts: Complaint was made by the railroad that these malleable castings were failing in service. The manufacturer of the castings made the request that he be permitted to alter the patterns in accordance with what his experience indicated would remedy the trouble. This privilege was not granted. The road then decided that malleable iron castings could not be depended upon in this particular case; so it was decided to have the castings made of steel. The steel men also objected to the design of the pattern, and, as almost always happens when a change is made from malleable cast iron to steel, they were allowed not only the privilege denied the others, but as can be seen, by reference to the illustration, they were permitted to thicken the sections by $\frac{1}{4}$ in. almost throughout. That changes were made in both design and weight is soon forgotten, but not that the steel casting stood up to the work and the malleable casting failed.

Physical Properties

As to physical characteristics of malleable iron, I know that you are all familiar. However, I have some photographs of heavy malleable castings that you will acknowledge have been severely abused. One is shown in Fig. 10. It very eloquently illustrates the fact that when malleable castings are made by those who understand the process, castings that possess many valuable characteristics are produced. When toughness and ductility, ease of machining and low cost are considered, I do not know what metal can compete successfully with good malleable cast iron.

The tensile strength of good malleable cast iron will vary between about 38,000 to 56,000 lb. per sq. in. When extreme ductility is desired, it is manifestly incompatible to specify high tensile strength. As in the case of carbon steel, so with malleable iron, ductility goes hand in hand with low ultimate strength. If high ultimate strength is desired, it can be obtained only by a sacrifice of ductility.

The elastic limit of good or of even indifferent malleable iron is equal to that of wrought iron and frequently exceeds it. When comparisons are made between this material and other metals, it would be more fair to consider the elastic limit rather than the ultimate strength, for it is the former upon which the engineer actually bases his calculations. The elongation and reduction of area of malleable are, of course, considerably less than of either wrought iron or soft steel. That both of these properties are high enough to impart great value to malleable castings is impressively attested by the illustration of the abused casting previously mentioned.

It is the custom of plants of fair size to run various furnaces on mixtures for different classes of work. The mixture from one furnace is not so well adapted to one class of casting as to some other. If the user of the castings will only take the manufacturer into his confidence and explain the use to which any particular casting is to be put, and the work expected of it in service, I know that loss of time will be avoided, and a superior product will be manufactured. Some consumers are under the false impression that for competitive reasons they should lighten their castings. This generally necessitates the introduction of more cores into the mold, the result being that the manufacturer is obliged to charge more per pound.

Automobile Specification

I presume that specifications are of more interest to the membership than perhaps any other one question in connection with this material. I have no desire to usurp the duties of the committee having this matter in hand, the work of which in all that has been done has been so commendable; but a few words in connection with the Society of Automobile Engineers malleable cast iron specification will, I trust, be taken in the spirit in which they are intended. I believe that a mistake has been made in specifying an upper limit for silicon. As a matter of fact, it is well known that the higher the silicon in the white iron

casting, provided the totality of the carbon in the casting exists in the state of carbide of iron, and all other conditions are correct, the better will be the finished product. I have shown that the manufacturer is obliged to eliminate his silicon to a point where all of the carbon will remain as carbide; also that the extent to which he must carry out this elimination depends wholly upon the heaviness of the sections. It is exceedingly rare that he errs in getting the silicon too high, because he does not need a chemical analysis to safeguard this. All that he has to do is to keep breaking his test sprue until he sees by the fracture that the iron is white, and that there are no particles of graphitic carbon in the fracture. He is more concerned in this particular than the purchaser can ever be, and to this extent the purchaser is protected. To specify an upper limit for silicon is about as necessary as to specify that the manufacturer shall pour his iron in the molds at a temperature sufficiently high to run his castings successfully. You can rest assured that he is going to look after the upper limit of silicon with as much fidelity as he will make sure that the iron is hot enough to avoid trouble through misruns.

On the other hand, it would be wise to specify a limit beyond which the silicon shall not drop; because, not only does the manufacturer err frequently in this direction in the making of black heart iron, but he is handicapped by having no reliable means of telling just when he is on the danger line. Analysis would take too long and the fracture gives no true indication. If the silicon is too



Fig. 10—Result of Hammering, Twisting and Bending Malleable Castings Without Fracture

low, an inferior product will result, and still the purchaser, if he be held to his specification, can be forced to accept the castings.

The Society of Automobile Engineers' specification allows the manganese to be as high as 0.70 per cent. No one ever saw and no one ever will see black heart malleable iron of good quality with such a manganese content. Provided certain precautions are taken, and certain ratios made between certain elements in the product, it is possible to make a good product in which the manganese might be as high as 0.40 per cent.; but to do so the manufacturer would have to be a master of his business and to know how to offset the evil effect of manganese.

The upper limit of phosphorus, 0.20 per cent., is all right, but it is actually the extreme upper limit that should be tolerated. The American Society for Testing Materials allows 0.225 per cent. as an upper limit for phosphorus, but this is by far too high. I feel confident that a good product could not be obtained if this limit were reached.

No mention is made in the Society of Automobile Engineers' specification as to carbon content, or the permissible amount of combined carbon tolerated; nor is any limit placed upon the allowable amount of total carbon.

The National Society for the Promotion of Industrial Education will hold its seventh annual convention in Grand Rapids Mich., October 19-25. On October 22 and 23 the National Committee on Vocational Guidance is to meet simultaneously with the society. A part of the latter portion of the meeting will be given up to a joint meeting between the society and the Chamber of Commerce of the United States.

A New Automatic Torsion Spring Machine

Wide Wire Range Combined with Diversity of Forms the Special Features

Sleeper & Hartley, 98 Beacon street, Worcester, Mass., have brought out an automatic torsion spring machine which is designed to meet the every-day needs of the man-

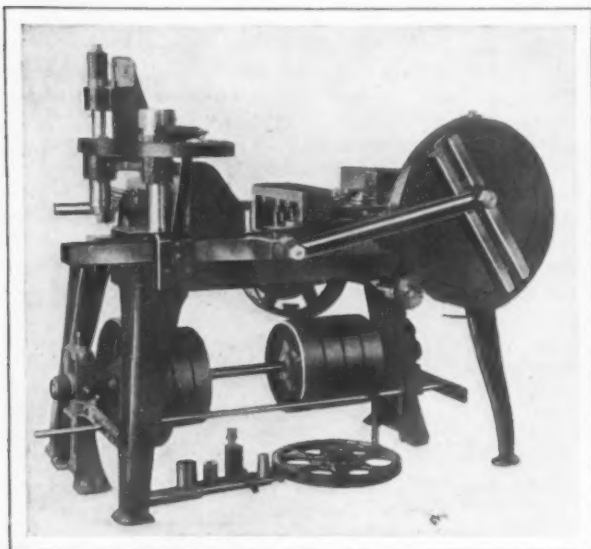


Fig. 1—The New Sleeper & Hartley Automatic Torsion Spring Machine

ufacturer. It combines a wide wire range with a large diversity of spring forms. The wire is taken from the coil and is fed, coiled and cut automatically. Spring forms may be wound either right or left hand, with any desired number of coils up to the capacity of the machine. The wire ends may be left any required length up to 7 in. and 12 in. respectively and at any angle. One end may be put across the coil, and, in some cases, bends may be made in the wire ends. The wire range is from No. 20 to No. 8. Wire from No. 20 to No. 14 may be made into springs of from 1 to 22 coils and in the larger sizes with from 1 to 13 coils. A two-speed countershaft gives an output of 18 or 30 springs per min.

The details of the mechanism are shown in Fig. 2. Power is transmitted from a pulley on the driving shaft at the opposite end of which is the pinion *a*, that en-

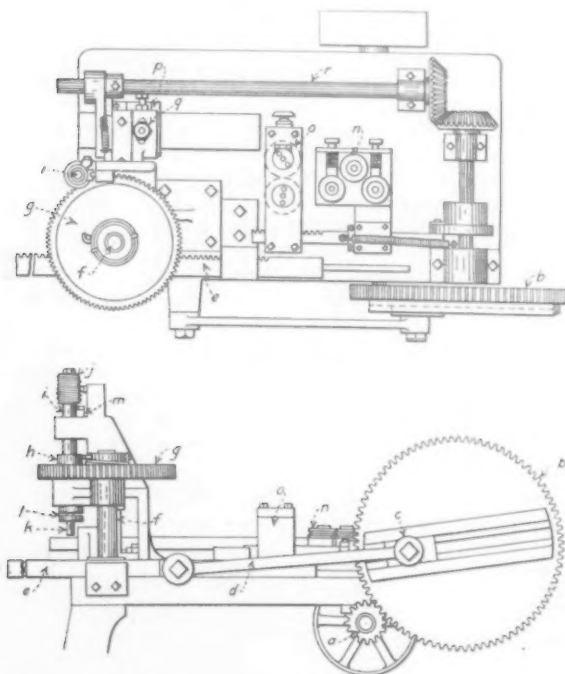


Fig. 2—Plan and Elevation Views of the Machine Showing the Mechanical Details

gages the large gear *b*, having on one face diametric ways for the adjustable head *c*. The head carries a crankpin connected by the rod *d* with the sliding rack *e*. The rack meshes with a pinion on the lower end of the shaft *f*, at the upper end of which is a clutch engaging a clutch member formed on the face of the arbor driving gear *g*. This gear is loose on its shaft, and meshes with the pinion *h* on the arbor spindle *i*, having at its upper end the worm *j*, which engages a stud fixed to the framework of the machine. As the arbor spindle rotates this engagement causes a rising or falling movement, according to the direction of revolution. The lower end of the spindle takes the spring coiling arbor *k*, which is provided with a collar, *l*, that carries the stud necessary in the coiling process, holding the initial coil on the arbor. The adjustable stop *m* regulates the degree of downward movement to conform with the desired dimensions of the work.

The wire is taken from a reel and passes through the straightening rolls *n* and the feed rolls *o*. Adjustable on ways is the plate *p*, and adjustable upon this, and at right angles to it, is the plate *q* having a steel bushing through which the wire passes on its way from the feed rolls to the arbor. Sliding on the front of the plate *p* is a plate, the motion of which is controlled by a cam mounted on the shaft *r*, carrying a cutting bar which shears the wire at predetermined intervals.

At the beginning of the coiling operation the arbor spindle is in its lowest position, with the arbor and the stud ready to receive the wire. The diameter of the arbor

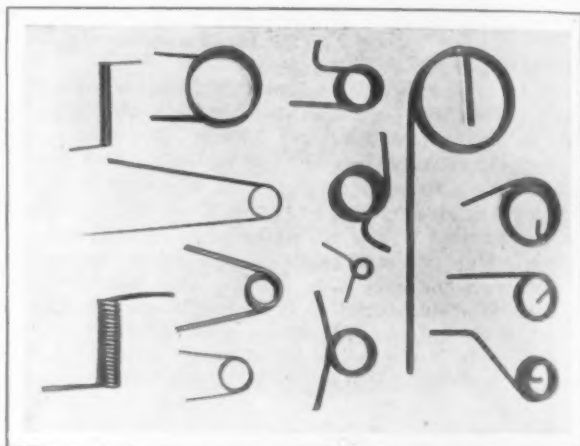


Fig. 3—Some of the Wire Forms Turned Out by the Machine

determines that of the spring, and the number of upward revolutions determines the number of coils. The pitch of the arbor worm fixes the distance separating the coils. The arbor and worm are removable, and adjustment for different sizes and types of springs is easily made.

Taking for illustration the spring shown in the lower left corner of Fig. 3, the wire is passed between the arbor and the stud a sufficient distance to form one arm. After the coils are formed, the reverse spindle motion is begun by the reversing of the rack *e*, Fig. 2. As soon as the slight coil in the spring has taken place, due to the elasticity of the metal, the cutting bar severs the wire, forming the other arm of the spring. The elasticity of the wire causes the spring to separate from the arbor, and it drops into a receptacle. The length of the second arm is determined by the position of the plate *p* on its ways.

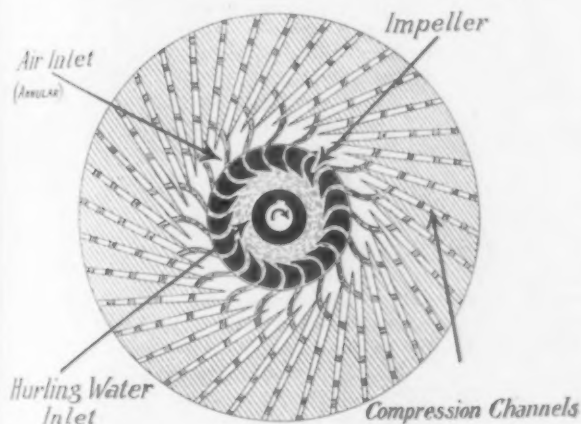
The machine requires a floor space 30 x 50 in. and weighs crated 1700 lb.

According to Charles R. King in the Engineering Magazine, steel castings are used very little for locomotive engine frames in Saxony or in Europe in general. They are usually made of rolled plate or forged bars, though the Saxon Engine Works has built Canadian engines with frames of "molded" steel. The bar type of frame is not trusted by European engineers, though its advantages are many. The plate frame is the type that survives more as an institution, even though less economical.

A Turbo-Air Pump for Condenser Service

A type of pump which operates to cause intermittent discharges of water to entrap air between successive discharges as well as entraining it on its surface, has been developed by the Wheeler Condenser & Engineering Company, Carteret, N. J. Pumps operating on this principle have been developed abroad on somewhat similar lines, but the greatest apparent difference between the foreign pump and that built by the Wheeler Company is the entire absence of an external ejector nozzle. In general appearance the air pump, which is driven at a high speed by either a motor or a turbine, is similar to a centrifugal pump.

In the accompanying drawing a diagrammatic sectional view showing the principle of air removal is given. It will be noticed that the pump consists of a small, high-speed impeller with a large number of ports or nozzles on its periphery, a ring of tapered compression channels and a discharge casing or volute, which is not shown. In operation, hurling or throwing water enters the eye of the impeller as in an ordinary side suction centrifugal pump and is impelled at high velocity through the ports in the impeller which rotates in the opposite direction to that of the regular centrifugal pump. Air is admitted around the entire periphery of the impeller and is drawn into the entrance of the tapered compressor channels by the aspirating effect of the rapidly discharged water. As the slugs of water move outward the tapering of the channels causes them to become elongated, thus decreasing the space between the slugs, and the entrapped air is compressed. The mixture of air and water is discharged from the tapered channels into a volute casing, somewhat similar



Diagrammatic Sectional View of the Wheeler Turbo-Air Pump Showing the Principle of Air Removal

to that of a centrifugal pump and is finally delivered through an outlet nozzle.

These pumps can be used for both jet and surface condenser work, and for the latter the turbo-air pump is frequently combined within a common casing with the condensate pump. Air and water of condensation are withdrawn from the surface condenser through a common pipe, flowing to a common suction nozzle on the pump. Within this nozzle there is a partition which separates the air and water, the latter flowing by gravity to the eye of the condensate impeller, which is of the ordinary centrifugal pump design, while the air and gases flow over the partition wall, direct to the annular air inlet surrounding the hurling water impeller of the air pump. Two volutes, one for the water of condensation and the other for hurling water and air, are formed within the single casting, so that as far as operation is concerned, the two pumps are entirely independent. Among the advantages claimed for this arrangement are that the amount of piping between the condenser and pump is reduced and simplified, the space ordinarily required by the two pumps for the air and the water of condensation is greatly reduced and both pumps are driven on a single shaft by a common turbine with a resulting saving in power.

It is claimed that pumps of this type will maintain a vacuum of from 98 to 99 per cent. of the theoretical vacuum corresponding to the temperature of the hurling or throwing water or temperatures ranging from 32 to 90 deg. F. and higher.

This pump also possesses large free air handling capacity and ability to withstand overloads. This last feature, it is pointed out, is due to the fact that there is a positive aspirating effect at the entrance of the numerous tapered compression channels into which the air must be drawn as long as the impeller rotates and discharges water. This, it is emphasized, is of importance, as if the air leakage on the condenser should be increased at any time by reason of the failure of the turbine seals, the pump would not refuse to handle the added load with a resulting break in vacuum, but will maintain a moderate vacuum until the air leakage trouble has been corrected.

In a recent test of this pump the maximum vacuum maintained by the pump was 1.10 in. and the theoretical vacuum corresponding to the temperature of the water, which was 78 deg. F., was only 0.96 in. of mercury. In the same test of the pump, a vacuum of 29.13 in. with outlet cooling water at 70 deg. F., which corresponds to a maximum theoretical vacuum of 29.30 in. was maintained while handling 4400 gal. per min. With 1720 gal. per min., the vacuum maintained was 28 in., the maximum theoretical vacuum being 28.11 in. for an outlet cooling water temperature of 98.6 deg.

Struthers Furnace Company Leases Iron Mines

MARQUETTE, MICH., June 7, 1913.—A newcomer in the Crystal Falls district, Menominee range, is the Struthers Furnace Company, Cleveland, W. C. Runyon, president. The company has taken a lease on the Hilltop and Victoria properties and will open the mines at once. Victor Laing, for 13 years with the Steel Corporation in the Iron River district, has been appointed superintendent. It is expected a force of 100 men will be employed in the development work.

Some of the largest stripping contractors in the Lake Superior region are submitting bids for the work of removing the overburden from Pickands, Mather & Co.'s big Mastodon property in the Crystal Falls district. It is expected that dirt will be moving early in July. Present estimates are that 1,800,000 cu. yd. of material are to be removed. Pickands, Mather & Co. will operate the property through a newly organized subsidiary concern, the Balkan Mining Company. Electrical power is to be furnished the Mastodon district by the Peninsula Power Company, whose hydroelectric plant at Twin Falls, on the Menominee river, 30 miles distant, went into commission several months ago. The company already has a transmission line to Iron River and this is only three miles from the Mastodon field. A sub-station for the purpose of stepping down and distributing the voltage will be erected. It is expected that the power will be made use of both at the Pickands-Mather property and the big mine to be opened in the adjoining tract by the Longyear interests. The rate charged is understood to be about 1 cent per kw-hour on a sliding scale, depending on the amount of electrical energy contracted for. The towers supporting the transmission line are of steel, imbedded in concrete, with the lowest wire support 40 ft. from the ground. The cables are of aluminum reinforced with steel. The wiring system is in duplicate. Several mines in the Iron River district are supplied with the power, as are those at Florence and Commonwealth.

The Cleveland-Cliffs Iron Company is employing a larger force of men at its properties at Negaunee, Marquette range, this season than for several years past. The crews at the Negaunee mine aggregate 500 men; there are 200 men at work at the Maas, and 40 men are employed at the ore crusher at the South Jackson property, this plant treating the product from the company's hard ore shafts in the Ishpeming field.

The Dominion Iron & Steel Corporation, Sydney, Nova Scotia, reports net earnings in the fiscal year ended March 31, 1913, at \$4,159,185 against \$4,714,057 in the previous year. After deductions for sinking fund and depreciation, bond interest, etc., the amount available for dividends at the close of the last fiscal year was \$2,131,715 against \$2,372,667 the previous year. After dividend payments the past year, a surplus remained of \$883,012. The current and working assets, March 31, 1913, totaled \$7,860,125, a decrease of \$2,530,920.

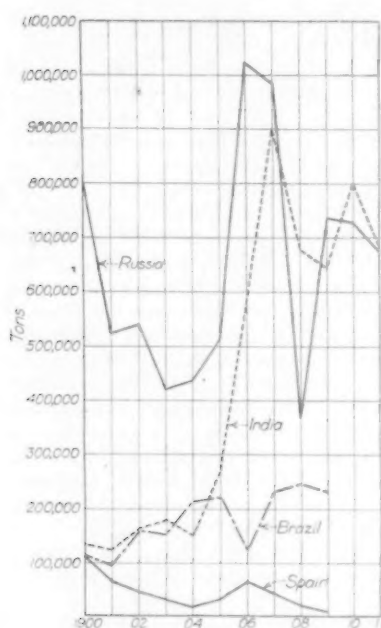
The World's Supply of Manganese Ore

India Leading Russia and Brazil as an Exporter—Changes in International Competition Due to Developments in Russia

The possibilities that the higher duty on ferromanganese provided in the Underwood tariff bill will increase its manufacture in the United States gives particular interest to an article by Dr. Kern,* an engineer of Munich, on the available supply of manganese ores from a German point of view. He states that the annual demand of the world for manganese ore of over 30 per cent. manganese was estimated by Venator in 1906 at 900,000 tons. The decided development of the steel industry since then has given an impulse to the search for new sources of ore supply. The present requirement for manganese, based upon a world production of steel of 60,000,000 tons and an addition of an average of 10 kg. of manganese per ton of steel is reckoned at 600,000 tons. If one adds to this about 30 per cent. for loss in slag absorption, etc., the estimate is increased to 800,000 tons per year, which would

correspond to a consumption of 1,600,000 tons, or 50 per cent., manganese ore. Opposed to this there is estimated an output of 1,700,000 tons.

The world's supply of manganese ores comes principally from Russia, India and Brazil. Spain used to play quite a rôle in supplying Germany, England and France, but it has lately gradually disappeared as a factor because of the deterioration of its ores. The diagram shows graphically the fluctuations in the supplies from the various countries since 1900.



Production of Manganese Ore in the Leading Countries

Spain increased from 8000 tons in 1910 to 26,601 and 29,761 tons in 1911 and 1912 respectively because of the unfavorable political conditions in Russia at that time.

The Manganese Industry of Russia

The principal sources of manganese ore in Russia are those of Nikopol and Tschiaturi, the yield being shown in Table 1 in metric tons:

Table 1—Russian Output of Manganese Ore

District	1906	1907	1908	1909	1910	1911
Nikopol	187,797	318,902	240,377	125,307	175,888	202,113
Tschiaturi	826,207	677,886	116,855	613,136	553,726	469,041
Total	1,014,004	996,788	357,232	738,443	729,614	671,154

Official figures for 1912 are unavailable, but the presumption is that the Russian consumption of manganese ores has risen as deduced from the low export figures. There is considerable agitation among Russian steel makers in favor of manufacturing a high manganese alloy instead of exporting ore. An expert has calculated that the cost of production of a ton of ferromanganese in Russia, using English coke, is 23 marks cheaper than in England using Russian manganese ore. The development of the Russian ferromanganese industry has been significant in the last few years; production in 1911 reached 25,000 tons and is steadily growing. To increase further the

*Stahl und Eisen, April 24, 1913.

home output of ferromanganese the Russian steel producers have influenced the Duma to increase the export duty on manganese ore from 0.92 mark to 1.53 marks per ton. The Tschiaturi ores are the only ones available for the export trade which is carried on in the ports of Batum and Poti. In Table 2 is given the export of Caucasian manganese ore from these ports.

Table 2—Export of Caucasian Ore

Year	Tons	Year	Tons
1895	149,500	1906	526,920
1900	492,400	1907	556,706
1901	346,000	1908	358,500
1902	485,000	1909	600,306
1903	495,700	1910	649,233
1904	544,600	1911	593,590
1905	381,500	1912	941,673

The history of the manganese ore market is plainly reflected in this table. The low figures of 1905 and 1908 are attributed to unfavorable political conditions and the Italian war with Turkey explains the falling off in 1911. The unusually high figures of 1912 are explained by the fact that poor shipping facilities, caused by the war in 1911, gave rise to an accumulation of some 200,000 tons of ore at the ports, which could not be shipped until 1912.

The present year will probably see a considerable diminution in exports of Caucasian ore. The past winter was very unfavorable to mining and labor largely migrated to aid in building the Caucasian Railway. The effect of speculation and a decided deterioration in the quality of the ore, the phosphorus content now being 0.18 per cent., are other unfavorable factors.

Manganese Ore Market of India

Manganese ore mining in India began in 1893, the first ore coming from the Vizagapatam district, and the main impulse to its growth came with the crisis in the Caucasian region. Co-operation of the Indian railroad authorities made it possible to develop manganese mining on a paying basis with the mines located 500 to 800 km. from the coast. Another factor was the low price of labor. The manganese ores of India excel those of Russia in quality, being in larger lumps and their phosphorus content being under 0.10 per cent. The output of India is shown in Table 3.

Table 3—Export of Indian Ore

Year	Tons	Year	Tons
1900	129,865	1906	579,231
1901	122,831	1907	916,770
1902	160,311	1908	685,135
1903	174,563	1909	643,000
1904	152,707	1910	813,722
1905	250,788	1911	681,015

From these figures it is plain that India can supply the deficiency from the Caucasian region as in the years 1908, 1910 and 1911, during which time it took its place at the head of the manganese producing countries. Bombay leads as the export port, 443,173 tons leaving there in 1911-12 as against 49,867 and 51,612 tons from Calcutta and Madras respectively. The destination of these Indian ores was distributed as follows in 1912:

England	26 per cent.	United States	20 per cent.
Belgium	28 per cent.	Germany	1 per cent.
France	20 per cent.	Holland	5 per cent.

Because of low wages and easy mining the present cost of Indian manganese is low, from 2.75 to 5.50 marks per ton, or an average of 4.15 marks. This will increase as the mines grow deeper. The transportation costs to the harbors are high, most of the mines being situated from 400 to 800 km. distant. The Vizagapatam mines are only about 90 km. away. From the inner provinces only high percentage ores are shipped. The ocean freight to Europe is 16 to 18 marks per ton.

The author states that the manganese mining industry of India has a great future. Low costs and the wealth of

the country in raw materials, such as iron ore, lime and lately coal also make it appear evident that the Tata Iron & Steel Company will develop decidedly. Steel works of India would supply all the lands washed by the waters of the Indian and Great oceans.

Production in Brazil

As with the Indian, the Brazilian manganese ore market development is attributable to the unreliability of the Caucasian market. Table 4 shows the exports for a period of years.

Table 4—Export of Brazilian Ore

Year	Tons	Year	Tons
1900	108,244	1905	224,377
1901	100,414	1906	121,331
1902	157,295	1907	236,778
1903	161,926	1908	250,000
1904	208,260		

The development of this market has been greatly retarded by high freight rates, but lately the railroad authorities have manifested a co-operative spirit so that the deposits at Matto-Grosso near the Bolivian border have been reached and are being developed. The ores of Brazil are distinguished for their high quality.

The World Situation

In recapitulation it can be said that the present situation of the manganese ore market of the world is such that the widely separated sources of supply, Russia, India and Brazil, can take care in normal times of the yearly increasing demand. But it should be borne in mind that careless methods of mining, especially in the Caucasian district, will cause the rich ores to be exhausted at a time not far distant. Recourse will be had of necessity to poorer ores with a consequent increase in cost. A manganese ore crisis like that of 1908 is not likely to recur very soon, since the various sources of supply can aid each other. But the German supply depends very largely on the Russian market. The extent to which this is true is shown by the figures for Germany's imports for 1912. Of the total of 523,125 tons Russia furnished 336,819 tons, Spain 30,707 tons, India 126,614 tons, Brazil 20,857 tons and Sweden 3980 tons. The imports from Russia were thus 64 per cent. of Germany's total. Dr. Kern urges Germany to become independent of the unreliable Russian source of manganese and to look about for other supplies. He concludes with an interesting table showing the relative costs per ton of the different classes of manganese ore:

	Cost of production and delivery to railroad, marks	Rail freight to steamer, marks	Freight to Germany, marks	Total cost, marks
Caucasian	6.50	17.00	11.00	34.50
Indian	6.00	12.00	17.00	35.00
Brazilian	6.50	14.50	15.00	36.00

From this it is evident that the cost of transporting the ore to Europe is about 80 per cent. of the price of the ore delivered. Of course, the ocean freight fluctuates, because of political conditions principally. In quiet times the freight from the Black Sea is about 10 marks per ton, but this increased to between 3 to 5 marks during the war troubles in Turkey.

Keeping the Shafting in Line

—BY C. R. TROWBRIDGE*

When a line shaft is originally erected, it is presumably straight and true, and the hangers and bearings by which it is supported are, or should be, accurately aligned and firmly secured. It is unfortunately true, however, that few such installations are permitted to remain in the correct relations in which they have been placed. Variations in loading upon floors, settlement of piers, unequal belt stresses, burden of pulleys and especially frequent disconnections and reconnections, combine to affect the truth of the whole and to prevent it from keeping in line.

Under such circumstances, it is essential that the properly designed transmission system should include ample opportunity for self-adjustment and for local correction. The fundamental requirement of a satisfactory journal bearing is that it shall be truly in line with the shaft it

self. This includes some form of freedom of movement, such as is given by a ball-and-socket support, permitting a small amount of oscillation in any direction to conform to the direction of the axis of the shaft. Such an adjustment is well recognized as an essential to every well designed hanger; but too often it consists merely of a sort of looseness which permits wobbling in any way, and does not provide really proper support. A true ball-and-socket unites firmness with adaptability and is self-adjusting, so far as variation in direction is concerned.

There is another set of adjustments, however, which demands individual attention, but which should be capable of being effected easily and accurately. These adjustments provide for the bodily movement of the bearing, both vertically and laterally, to conform to any actual shifting in position of either shaft or hanger. With such adjustments, capable of correcting for any change of position and yet free, independent and unintentional shifting, the problem of keeping the shaft in line becomes simplified to an extent which renders excessive friction losses inexcusable.

The question of lubrication has been met in a number of ways, and the so-called self-lubricating bearings require so little attention that this point may be considered as wholly solved.

Safety Valve Rating

A book entitled "Safety Valve Rating" has recently been privately published by Albert B. Carhart, covering a comparison of safety valve rules and a proposed new rule. It is intended simply as an engineering discussion of a subject on which but little information has been available. It was thought that perhaps this was the most direct way of reaching persons who might be interested in the subject. Illogical assumptions in the present rules for boilers are discussed. An entirely new rule from an engineer's point of view is offered. All the mathematical calculations in detail are included, rendering the subject very clear. The limitation of the size of valves, the disadvantages of larger valves and increased lift, and the advantages of flat-seated valves are pointed out. There are 105 pages in the book and it is considerably more than an elementary treatise. It is therefore of value to engineers in particular. Mr. Carhart is superintendent of the Crosby Steam Gage & Valve Company, Boston, Mass. Those interested can have a copy by simply addressing the author.

Performance of a Vanadium Tool Steel Reamer

A vanadium tool steel reamer that has been in service in the plant of the Buffalo Gasoline Motor Company for over two years has made a somewhat noteworthy record. In this period the reamer has finished two $1\frac{1}{4} \times 1\frac{1}{2}$ in. holes in 3600 gasoline engine pistons, or 7200 holes in all, and the wear has only been 0.005 in. This particular reamer did only the finishing work, a roughing reamer being sent through the hole, first. The McInnes Steel Company's Cello tool steel, which is an oil-hardening vanadium steel, was used. Carbon tool steel reamers previously employed had an average life of about three months. At the present time, the Buffalo Gasoline Motor Company is using this brand of steel for both finishing and roughing reamers and also for dies, taps and chisels. It is estimated that a saving of at least \$1000 is made annually in the cost of tool steel.

L. Vogelstein & Co., 42 Broadway, New York, furnish the following figures of German consumption of foreign copper for the months January to April, 1913: Imports, 72,819 tons; exports, 3650 tons; consumption, 69,169 tons, as compared with consumption during the same period in 1912 of 67,285 tons. Of the above quantity 61,312 tons was imported from the United States.

The Orenstein-Arthur Koppel Company has given the agency for its Canadian business to the Canadian Fairbanks-Morse Company, Ltd., having offices in Montreal, St. John, Ottawa, Toronto, Winnipeg, Saskatoon, Calgary, Vancouver and Victoria.

*Hodge Mfg. Company, Mishawaka, Ind.

The Steel Corporation Dissolution Suit

Percival Roberts, Jr., of the Board of Directors, Testifies on a Wide Variety of Phases of the Steel Trade

Beginning late on Tuesday afternoon, June 3, and continuing on subsequent days, Percival Roberts, Jr., a director of the Steel Corporation and also a director of the Pennsylvania Railroad Company, testified in behalf of the corporation. His testimony on Tuesday and Wednesday was largely of a technical character, explaining how the peculiar conditions and the tremendous development of the iron and steel industry in the last forty years have made obligatory the aggregation of large amounts of capital to meet the necessity of turning steadily increasing quantities of iron ore into the finished product.

More and More Capital Needed in Every Decade

Mr. Roberts, who has been in the iron and steel business for more than forty years, starting with the Penney Iron Works, Philadelphia, gave a great amount of technical detail, describing the important epochs of the steel industry, showing how in each decade more and more capital was needed to combine in one corporation the various branches of the industry from mining the ore to the delivery of the finished product to the customer.

Mr. Roberts showed first how the substitution of soft steel for iron meant changes in the units of production. Prior to that time puddling furnaces turned out iron in small masses and the various branches of the iron business were all operated separately. With the development of the processes for making steel, however, more elaborate machinery was necessary and at the same time it became apparent that with the use of this machinery there would be a tremendous saving of labor and cost of production by combining various branches of the industry under one head, "integrating," as it is termed. Mr. Roberts explained:

These revolutions were the fundamental reason for the aggregations of works prior to 1898. Certain of the works were integrating, like the Federal Steel Company and the Carnegie Steel Company, backward to their supplies of raw material and to the extent where they formerly had been buyers.

After quoting figures to show the tremendous output of steel by decades, Mr. Roberts said: "To the year 1900 very many if not the majority of those concerns which did not integrate sufficiently to control their supply of raw material failed in business or were abandoned by their owners."

As a further reason for the necessity of great amounts of capital, he pointed out that the history of the industry has shown clearly that machinery does not wear out from use but becomes obsolete from changes and developments which take place in the art of steel making. Mr. Roberts said that integration was necessary only in cases where there was a big tonnage. Referring to the different branches of the industry, he said:

For each of the independent units to have become of sufficient size to have substituted steel for wrought iron would have made such a stupendous overproduction, far beyond the demand, that it would have been an economical absurdity and impossibility. The money could not have been obtained.

He enumerated many failures that occurred in the days of the evolution of the industry. He also said that prior to 1900 there was more bargaining over the price of rails, but that today railroad officials were willing to pay a premium of more than \$2 a ton for rails made after special specifications and furnishing greater endurance than ordinary rails.

Policy of the Corporation on Some Points

Mr. Roberts was examined at length as to the policy of the Steel Corporation in regard to foreign trade. He read from the minutes of the executive committee of which he was a member at the time of the formation of the corporation to show that the directors planned to en-

gage in foreign trade as a means of selling their surplus output, but on a permanent basis. He explained the reorganization of the foreign departments of the different subsidiary companies and said that the advantages of the Steel Corporation in foreign trade were like those of a big department store over a smaller concern.

Every steel company should have a reserve of ore to last fifty years, he testified, if it would be in condition to meet the competition of its rivals. He pointed out that those that did not have the foresight or the capital to establish reserves of iron ore invariably went to the wall. From the minutes of the executive committee the witness read accounts of the refusal of the Steel Corporation to buy various plants, and he pointed out how those plants are today important rivals.

Interlocking Directors

The relations of Mr. Roberts as a director of the Pennsylvania Railroad Company and of the Steel Corporation were brought out. When for several years he was off the United States Steel board and was a Pennsylvania Railroad director, he said, he was on the supplies committee of the railroad, but he never took any action in fixing the price to be paid for steel rails. Since he has been a director of both concerns, he said, he never has taken any action to influence the action of either company in its dealings with the other. The by-laws of both corporations prevent that, he said. He continued:

The term interlocking director is entirely misleading. It is not a new feature of corporate life. There have always been directors common to more than one company and the ethics of corporations, as, indeed, the ethics of law, provide for the conduct of directors who may be common to more than one company. It might be with equal propriety applied to a lawyer, who has more than one client, but the ethics of law provide that in case of differences between two clients common to one lawyer the lawyer takes no action in reference to either side. It is the same with corporations and their directors. In such cases they step aside and do not participate.

The Hill Iron Ore Properties

Continuing his direct examination on Thursday, June 5, Mr. Roberts, replying to a question, stated that he was not a member of the board of directors of the Steel Corporation at the time the lease of the Hill ore properties was negotiated but at the time the lease was surrendered he was a director and a member of the finance committee. He gave as the reasons actuating the corporation in surrendering the Hill lease as two: One was commercial, namely, that the ore had not developed entirely the quality that had been expected, and the other was the criticism of the Government as to the amount of the Steel Corporation's ore holdings.

The majority of the committee, for these reasons, deemed it wise to exercise the option which they had in the lease for cancellation in 1915. Mr. Roberts did not coincide with those views entirely as, notwithstanding the criticism of the Government, he believed that the corporations's ore reserves were none too large for the satisfactory operation of its plants, but deferring to the opinions of the majority he voted in favor of canceling the lease.

The Steel Corporation and Its Competitors

Replying to another question, Mr. Roberts stated that it would be a physical impossibility for the Steel Corporation to crush or drive out of business its competitors. He said:

The nature of the steel business is such that should a trade war be inaugurated at this time destruction would occur to either party. Both would be practically crippled, the larger concern suffering just in the same proportion as the smaller one, due to its larger production and the greater losses which it would sustain in the reduction of its prices to an unremunerative point. It is an absolute

impossibility to successfully destroy its well equipped rival.

Q. Has the Steel Corporation to your knowledge ever attempted to crush a competitor or attempted to secure customers of other concerns by secret inducements or other unfair means or attempted to secure the business in particular localities by unfair means? A. It never has in any manner, shape nor form. It has at all times sought natural and healthy competition.

Q. Has the corporation to your knowledge at any time sought to drive any competitor out of business by making low prices in one locality as compared with the ordinary current prices over the country? A. It never has. Basing prices for all materials have been at Pittsburgh plus freight to destination. There may be at the immediate present some prices based on Chicago plus freight, but it has been the universal practice in the steel trade, not only with the United States Steel Corporation but with others, to use Pittsburgh as the basing point for all quotations.

Q. Did that practice of using Pittsburgh as a basing point originate before or after the organization of the United States Steel Corporation? A. Many years before.

Reasonableness of Its Prices

Q. What has been the policy of the corporation to its customers as to stability, impartiality and reasonableness of prices? A. It has at all times sought to maintain reasonable prices and to reach directly the consumer without the assistance of the middlemen or broker. Prior to the formation of the Steel Corporation, the steel trade was largely in the hands of brokers who took the specification of the consumer and handled it on a commission basis. One of the earliest plans of the corporation was to eliminate this percentage basis and seek the consumer directly by the establishment of warehouses and carrying stocks.

The Steel Corporation has sought as far as possible to maintain prices within reasonable limits without the wide fluctuations that formerly took place and which in many cases were forced upon the producer by concerns who were at times in such stress as to be forced to dispose of their products much below the prevailing market prices to enable them to obtain necessary funds to meet their requirements. As a matter of fact, as a result of these violent depressions from one cause or another the pendulum of prices swung to the other extreme and those who weathered the storm of depression raised their prices just in proportion as they had been too low before to too high a point afterward.

Consumers suffered in this, and since the inauguration of a more stable market they have been enabled to conduct their business with less money invested in stocks and material, feeling more assured of a stable market than they had been in the past. Another benefit to the consumer has been in enabling him to procure a uniform quality of material, which has been brought about by the operations of the United States Steel Corporation by consultation with its experts and their ability to adapt and use new processes and improvements which from time to time are made.

Mr. Roberts was here led to the question of the policy of the corporation as to exacting premiums for prompt delivery in boom times or otherwise, and his answer corresponded with the testimony given by President Farrell, that such had never been its policy. He confirmed President Farrell in the statement that since the formation of the corporation the tendency of prices had been downward, not with a regular constant movement but with temporary fluctuations controlled by the law of supply and demand. It has been a steady downward movement since 1900, he said, with an increase in wages during the same period.

Character of Trade Paper Market Information

Much time was here taken up with an inquiry into the course of prices on steel products in connection with tables submitted by Francis Walker, a witness for the Government, giving prices of beams, black sheets, tank plates, steel bars, etc., at Pittsburgh for a long series of years, based on *Iron Age* prices. The attorneys for the Government and for the corporation wrangled with regard to the character of questions to be asked Mr. Roberts relating to these tables, and the outcome was an inquiry into the difference between market quotations and actual prices received by manufacturers.

Mr. Roberts stated that the market prices as given in trade papers are theoretical and do not represent in detail actual selling prices. They, as is the case with other daily news, he said, are the result of information gleaned on the street and otherwise and represent the

best judgment and opinion of those who collect it and express their own individual views at times and are sometimes based on some one transaction or more from week to week. In connection with these market prices, he said, it is necessary to consider the nature of the product sold, the variety of the product, the frequency of the sales, and whether large or small, numerous or few. He continued:

A man seeking information for a market report would daily obtain a great number of such quotations and it would tend to produce in his reports a more fluctuating tendency over a period of time in giving the market prices than in the case of the sale, for instance, of beams, where the manufacturers are few in number. For instance, about the year 1900 over 75 per cent. of the structural material in the United States was produced by three concerns. The nature of the sales of this material was such that there was not nearly the frequency as in the case of bars. In making the market price some one individual building in a certain city or an individual bridge at a certain destination would establish what would be known as a market price extending over a considerable period of time until, possibly another structure of the same kind might be reported at different figures. [Mr. Roberts here appeared to be confusing prices on fabricated work with prices on plain structural material, as it comes from the mill.—Editor *The Iron Age*.]

Explains a Controlled Market

His attention being called to occasional straight lines on the diagram referring to prices of a particular product, Mr. Roberts said:

A straight line on the diagram indicates nothing in regard to a controlled market. For instance, the beam pool was established January 1, 1897, and operated from that period, during which time there was a controlled but fluctuating market. Prices fluctuated in accordance with supply and demand, always within reasonable limits. The object and purpose of the beam pool were to keep prices reasonable and to prevent destructive competition. There was nothing to hinder the members of the pool changing the prices from month to month and it was frequently the custom to do so; nor was it impossible to vary prices as between each manufacturer. A controlling factor in the pool was the percentage of output or the percentage of orders—the percentage of the business of the country allotted to each member. Within that allotment he was expected to retain all his profit; in what he manufactured beyond that allotment he shared his profit with others, but there was nothing to prevent each individual member of that agreement selling below the market price, if he saw fit, his own individual product.

Mr. Roberts's Memory Somewhat at Fault

Asked with regard to technical developments tending to greatly reduce cost of manufacture in the last half of the decade ending in 1900, Mr. Roberts made the following remarkable statement regarding a period which history records as having been almost revolutionary in the adoption of labor-saving appliances in steel plants:

In that ten year period there was no technical development whatever other than improvements in details, refinements in processes and a growing demand which at times toward the end of the period exceeded the supply. It was a period in which in the earlier part of the decade, due to improvements which had taken place in 1890, the output of the country was very materially increased and exceeded the supply. The reverse occurred at or about the termination of that ten year period. About the year 1895 the only change which occurred was the introduction of Mesaba ore which at that period could be used to only a limited extent in a blast furnace and which until about 1900 could not be considered in anything like the same light as since that date.

Q. How were prices in 1897 and 1898 as compared with any other years in the history of the industry so far as you know it? A. In certain lines, such as rails, they were lower than they had ever been before and much below the cost of manufacture.

Q. How were they in other lines besides rails? A. In 1896 and 1897 the prices of beams was below cost and lower than ever before in their history.

Q. What was the cause? A. It was largely one of destructive competition brought about by the attempt of the Carnegie Steel Company to run its plant full at a time when consumption did not amount to the production of the country.

Q. Did these low prices result from any technical improvements occurring at that time? A. They did not and they were below cost.

Q. What was the general condition of business in all lines in 1899 and 1900? A. Active and at good prices.

Q. Was that local to the United States or was it world-wide? A. It was world-wide. It was after the conclusion of the Spanish war and everything in all lines of trade was active. During those years the demand exceeded the supply.

Q. To your knowledge obtained during your connection with the United States Steel Corporation, will you state whether or not it has in any respect restrained trade or has it extended trade? A. It has been the very great means of extending trade, not only domestic but foreign; the latter in a way which could not be done by any other organization now in existence in this country. This foreign trade is only possible by reason of this organization and the diversified products which it handles. So far as domestic trade is concerned, the reasonableness of prices has increased consumption as against a very widely fluctuating market that existed previous to its organization.

Trade Paper Market Quotations

The witness was here asked with regard to quotations of prices in trade papers. Mr. Roberts stated that he attached the same importance to those publications as he would to any hearsay evidence. If such evidence came from the buyer or seller who actually made the transaction, that would have one degree of credibility; but if it came from another who had received it from a third party it would depend on circumstances as to what that credibility might be. He made a distinction between the market price and the selling price, stating that the latter depended upon, in every individual instance, the credit of the buyer, the time of delivery in which the goods were required, and a number of other circumstances, such as the specifications which might be attached to the order. A party who wished to buy bars might see the market price in the papers but he would not send his order at that price without obtaining a quotation first.

Mr. Roberts would not admit that the quotations given in the trade papers were useless, explaining that they were of the same use as a thermometer would be in determining temperature, giving the buyer or the seller some idea of what was going on. If a man was a buyer of an article, the trade paper quotation would give some indication of about the selling price but not the exact price in all cases.

Mr. Roberts here gave an instance of a sale of beams made by his company in November, 1906, at a price much below the market price reported at that time in the trade papers, and his price, he said, was met by his competitors in subsequent transactions but not until about six months afterward did the trade papers reduce their quotations.

In reply to a question of the value to the trade of such publications, Mr. Roberts stated that they indicated the general values prevailing at the time. It was not attempted to specify definitely that these were actual selling or buying prices as buyers and sellers before proceeding with their transactions would verify the information which they had obtained from the trade papers. In some instances the prices given were exact, but he could form no estimate of the proportion of instances in which such prices were exact and in what proportion they were not. He stated that individual sales have always been made by the Steel Corporation at varying prices notwithstanding the base prices published from time to time in trade journals purporting to be those at which the corporation sold. In such sales the prices would depend upon tonnage, the credit of the customer, the desirability of the order, the time of delivery, etc. He stated that he never knew of any published prices of the Steel Corporation, nor did he know of prices being announced by the corporation, nor did he know that reporters went to the corporation from time to time and got announcements of prices, nor did he know of any prices announced by President Farrell.

Mr. Roberts stated that all conditions being equal, the corporation would treat its customers alike. Two customers, for instance, having identical specifications, identical time for delivery, identical quality of material, identical credit would, at the same time, receive, no doubt, the same quotation.

Cross Examination of Mr. Roberts

Under the persistent questioning of Judge Dickinson, Mr. Roberts maintained adherence to everything he had

said on examination. Although the cross-examiner sought detailed information concerning the capitalization of plants fifteen and twenty years ago and asked many similar questions, Mr. Roberts only smiled and calmly announced he could not give it. "I am not a walking directory," he answered to a long question put by the inquisitor.

The cross examination was continued on Friday. Judge Dickinson asked if standard steel rails sold for \$33 a ton in November, 1898, following the formation of the rail pool by Messrs. Gary, Frick and Carnegie. The witness replied that he did not remember any specific instance of sales at this price, but he understood rails had reached \$32 or \$33 a ton in 1898. He said that in the spring of 1901, the time the corporation was formed, rails sold at about \$26 and remained at that price for two or three months.

The witness was questioned regarding the system used in 1900 by A. J. Cassatt, then president of the Pennsylvania Railroad Company, to purchase rails for the road for the entire year. Mr. Roberts replied that he was not then an official of the railroad, and his knowledge of the transactions had been obtained from trade journals at the time, and perusal of records of the Pennsylvania Railroad since 1908, when he became a director and a member of the supplies committee.

Judge Dickinson objected to the testimony by Mr. Roberts given under direct examination regarding the purchase of steel by the Pennsylvania Railroad, claiming that his knowledge was "secondary" and "hearsay."

Mr. Roberts was questioned at length regarding patents covering the manufacture of seamless tubes and of the litigation between the Shelby Steel Tube Company and others concerning patent rights for manufacture of seamless tubes. His knowledge did not appeal to Judge Dickinson as being first hand. Mr. Roberts said that lap weld and seamless tubes are not competitive, due to the fact that the seamless tube could be substituted for any purpose for which the lap weld was used, but the lap weld tube could not be used for purposes for which the seamless tube was adapted, especially for stationary and locomotive boilers, where high pressure was encountered. One product was universal in its use, he said, and the other restricted.

The witness said he never had any connection with any pools other than the structural pool to which he had previously testified. At the time this pool was in operation, none of the members, himself included, believed the combination to be illegal and there was no secrecy regarding the membership or price list of the structural pool.

Bureau of Standards' Work in Metallography.

The Bureau of Standards at Washington is now equipped to carry out certain investigations in metallography in its wider sense. Not only microscopical but thermal analyses are included, together with the correlation of physical properties with microscopical structure. The tests the Bureau is prepared to carry out are as follows: (1) Cooling and heating curves, melting points, heat treatment of alloys as specified. (2) Preparation of specimens and photomicrographs of specified magnification up to 1000 diameters (higher magnification by special arrangement); microscopical examination after special heat treatment. (3) Examination of metals after failure for evidence of the cause of failure; determination of various physical constants of metals and their temperature coefficients.

The members of the American Society of Mechanical Engineers in Milwaukee and its vicinity have organized a local section and a committee, consisting of Fred. H. Dörner, Power Improvement Company, chairman; Arthur Simon, electrical engineer Cutler-Hammer Mfg. Company; E. P. Worden, chief engineer Fred. M. Prescott Steam Pump Company; M. A. Beck, and Henry Weickel, chief engineer Pawling & Harnischfeger Company, has been appointed. It is proposed to hold not less than two meetings a year, and to co-operate in professional meetings and other matters with the Milwaukee Engineers' Society and the Milwaukee section of the American Institute of Electrical Engineers.

Chairman Gary's Direct Examination Closed

Denies Existence of an International Rail Pool—Tells How He Heard of the Wire Pool—Explains the So-Called Gary Dinners

On Tuesday, June 3, Judge Gary, chairman of the United States Steel Corporation, concluded his direct examination in the dissolution suit. In answer to a question as to whether the Steel Corporation ever made or attempted to make any arrangement with foreign producers in regard to the price of rails, Judge Gary said that neither he nor his corporation ever did such a thing. He said there was no agreement with foreign corporations to stay out of the American market. The American-made rails, said he, are superior to the foreign rails. An extract from the minutes of the finance committee of the Steel Corporation, which had been read to William E. Corey, was read to Judge Gary by R. V. Lindabury, counsel for the defense. The meeting was on November 1, 1904, and the minutes said:

The president brought up the question of making some arrangement with foreign producers in regard to the price of rails to be sold in neutral markets. After a full discussion it was referred to Messrs. Gary and Corey with power.

"What do you say about that?" asked Mr. Lindabury.

"I say it was probably done to bury it," said Judge Gary. "The committee never took any action. If anybody suggested to me that an agreement could or ought to be had of any sort I know very well what my answer would be. Of course I must admit that Mr. Corey might have made an agreement and kept it secret from me, but I have no reason to think he did."

Ordered Pooling Arrangements Stopped in 1904

Judge Gary said that in 1904 he gave orders to the counsel of the corporation that all pooling arrangements and agreements of which the subsidiaries were a part, which in any way could be considered illegal and contrary to the law, should be immediately abandoned and done away with. These orders were followed out, with the exception of the wire pool in which the American Steel & Wire Company participated. Judge Gary, however, did not become aware of this until 1908, when a man came to his office and surprised him by saying he had facts showing the Steel & Wire Company's part in the pool. The matter was immediately given to Charles McVeagh, then general solicitor for the corporation, with instructions to investigate and find out if the pool, if there were one, was illegal, and if such was the case, to make certain that the Steel & Wire Company's participation was immediately abandoned. Judge Gary pointed out that this action was known two and one-half years before indictments were brought against members of the pool.

Continuing, he said that no pools whatever were entered into following the formation of the Steel Corporation and any that existed after 1901 and which were wiped out in 1904 were "hold overs" which existed previous to the formation of the corporation. So far as he knew, prices of steel products have not been fixed by agreement between manufacturers at any time since the organization of the corporation; neither has the percentage of output been fixed by agreement between manufacturers since 1904.

He explained the fixing of rail prices by stating that it has always been customary for the corporation to name its prices each fall for the following year. "The basic price of \$28," he said, "has continued largely because the Steel Corporation refused to advance it. We have taken our position and the others have been obliged to follow, notwithstanding that the cost of manufacture has materially increased." He said also that orders from railroads oftentimes depended on the amount of business that the Steel Corporation gave to the railroad in the way of transportation. He denied that the corporation ever bought pig iron at prices above the market in order to raise the market price. Any material bought was for the corporation's use.

The Gary Dinners

Judge Gary was questioned concerning the dinners which he gave to steel manufacturers at various times during the panic of 1907, the object of which, the Government charges, was to fix prices. He denied that allegation flatly. The idea, he said, originated in his own mind in the panic, as a means of preventing a complete demoralization of the steel and iron business that undoubtedly would have prolonged the evil effects of the panic. Had prices of steel and iron suddenly dropped, he said, and the trade become demoralized as in previous years, loss and perhaps failure to many corporations would have followed. "An old fashioned steel war," he said, "meant destructive competition and ruin to many people." He continued:

The purpose of these dinners was to bring manufacturers together to establish a friendly feeling in order to prevent such demoralization and establish stability of business. It was my object to prevent—not by agreement, but by exhortation—wide and sudden fluctuations of prices which would have been injurious to steel manufacturers. There was no agreement expressed or implied to fix prices. It was proposed that each manufacturer let the other know what he was doing, what prices he was charging, what wages he paid and what methods he employed. It was our purpose to come together as friends, not as enemies.

This "co-operative" idea failed to work he continued, and in 1909 the corporation was "forced to abandon the plan of giving information to other manufacturers." He said:

Conditions changed. Prices were being made below the advertised prices in the trade journals and it became evident that there was a disposition to publish at one price and sell at another without notifying us. We ascertained that we were the only ones that were selling at the prices that were advertised, so I said to our competitors, "Gentlemen, I must withdraw from any meeting where you expect to get information from me." It got to a point where we were not getting our fair share of business.

Mr. Lindabury took up each of the Gary dinners separately, and Judge Gary told what happened in each instance. He said that none of the committees formed at the dinners was appointed to limit output, regulate prices or apportion prices. Neither did any committee attempt anything like this. He denied emphatically that prices, agreements or divisions of territory were ever made at the dinners or were the result of them. Two dinners with foreign manufacturers were held in 1908. The speeches made by Judge Gary at all the dinners were put in evidence to show that there was no idea of fixing prices.

The Corporation's Policy of Publicity

In answer to questions Judge Gary stated that there are 150,000 holders of stock in the Steel Corporation of whom about 35,000 in round numbers are employees. It has always been the policy of the corporation, he asserted, to make public all of its activities and the results achieved therefrom. At great expense, he said, the corporation complied with the order of the Department of Commerce of the Federal Government in 1905 to permit a thorough examination of all the records, books, accounts, etc., in its possession. He related the details of his visit to the White House in that year to see President Roosevelt when Commissioner of the Bureau of Corporations Garfield and others were present. The memorandum of that visit prepared by Mr. Garfield and introduced in evidence quoted Judge Gary as saying his corporation "desires to co-operate with the Government in every way."

"Furthermore," Judge Gary stated, "what has never been done before, we have kept our competitors, employees and customers well informed about our general

(Continued on page 1458)

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The Steel Markets of the 'Nineties

Percival Roberts, Jr., who testified in the Steel Corporation hearings last week, is entitled to his own opinions as to the market quotations published from week to week in journals devoted to the iron and steel trades. But his citation of a fabricating contract he took late in 1896 at a price figuring back to 1 cent a pound for plain material or several dollars a ton less than the beam pool price which was quoted at the time in *The Iron Age* is a very slender basis for his statement that published iron and steel prices are "theoretical" and do not as a rule closely represent the prices at which material is bought and sold. Mr. Roberts's contact with the steel trade in the eighteen-nineties was with a comparatively limited section of it. The output of the structural mills of the United States in 1896 was only 495,571 gross tons and in 1897 it was but 583,790 tons, against 2,846,487 tons last year. He was engaged in a business in which, especially where a fabricating plant and a beam mill were under one management, the methods of "maintaining" a pool price on plain material and at the same time giving a building company a figure that would take its order were various. Moreover, the market reporters of 1896 and 1897 were fully alive to these evasions.

Conditions in the structural trade in the latter part of 1896 were peculiar. The manufacturers were at that time endeavoring to maintain an association for the purpose of controlling prices. This association was loosely constructed, depending for its maintenance on the verbal agreement of the members. General trade was bad at that time and our current market reports contained a number of references to the difficulties encountered by the manufacturers in trying to keep faith with their colleagues and yet secure enough work to keep their plants in operation.

In the issue of *The Iron Age* of November 5, 1896, our Philadelphia report, dated November 3, referred as follows to finished material: "Extremely low prices have been quoted: 1.15c for bars, 1.20c for angles, 1.20c to 1.25c for plates, and other articles in proportion; but the idea was to secure work for November so that whenever there seemed to be a reasonable chance for business prices were marked down accordingly. These quotations are not expected to be in force for more than 24 hours at a time and it is quite possible that a tenth advance may be quoted by the time this article is in print." This statement was made on the eve of the election of President McKinley, after the great McKinley-Bryan free silver campaign. It would seem to give the reader quite convincing information of such a dip in prices as that to which Mr. Roberts alludes in his testimony.

In the issue of *The Iron Age* of November 12, 1896, one week later, the Chicago report, telegraphed under date of November 11, states: "Beam prices are giving way a little further and orders are said to have been placed at 1.50c Chicago, or lower, but the regular quotation is nominally maintained. A meeting of the manufacturers will be held in New York on Thursday when the question of continuing the agreement will be considered."

In the issue of November 19, 1896, *The Iron Age* says editorially: "The beam makers have got together and have proceeded beyond the 'gentleman's agreement' which led to queer complications. The basis now is an allotment with a majority vote on prices instead of the unanimity voting, with its flavor of the old

Polish parliament." The "queer complications" to which reference is here made were such practices as naming full pool prices on a contract and then throwing in with the plain material such trimmings as rivets or the angles which might be needed in finishing or attaching columns or doing other work in connection with the beams. The Chicago report in this issue said: "The beam situation has been cleared up by the recent meeting of the manufacturers who decided to maintain prices on the old basis." Elsewhere the pool prices of that time were referred to as those at which structural steel "is supposed to be sold."

It will be observed from these citations from our columns that the situation was one in which a market reporter found exceedingly great difficulty in naming figures at which actual contracts were being placed. It would seem that wherever possible the structural manufacturers asked and obtained the pool prices but that when some important matter came up involving a considerable quantity of beams there was something of a scramble as to who would make a price low enough or offer inducements strong enough to capture the business. Those whose memories can be refreshed on some of the occurrences of those stirring times, which were not ignored in market reports, know that 1 cent a pound was not the lowest price at which steel was sold for buildings of cage construction. In an important Central Western city as low as 90 cents per hundred pounds was the basis for one building.

There will doubtless be some surprise in the steel trade at the prominence given to Mr. Roberts's testimony by the Steel Corporation attorneys, in view of the character of his contact with the industry considered in its length and breadth. One is led to question, also, the source of his information concerning conditions in the iron and steel trades in the decade 1890 to 1900. Asked whether there was in the 'nineties a marked technical development which had greatly reduced the cost of manufacture, as a Government statistician had asserted, Mr. Roberts replied: "There was no marked technical development whatever, other than improvements in details, refinements in processes, and a growing demand which at times toward the end of the period exceeded the supply."

In the effort to substantiate his remarkable dissent from the common opinion concerning the changes that crowded into the last decade of the 19th century, Mr. Roberts said, for example, that Mesaba ores were only coming into use in 1895 and in the second half of the decade could be used to but a very limited extent in a blast furnace. The facts are that in 1895, the fourth year of the shipment of Mesaba ores, they made up more than 25 per cent. of the entire output of Lake Superior ores and by 1900 were more than 40 per cent. of the total. In three years after they came on the market, or in the year 1895, when Mr. Roberts says they began to be used, they constituted a large part, as high as 90 per cent. in some instances, of the mixture of important Valley furnaces. The coming in of Mesaba ores and their wide and increasing use was one of the most important developments of a decade in which, as Mr. Roberts reiterated in answer to one question, "there were no marked developments whatever."

That was the decade, moreover, in which the 500-ton blast furnace, with skip hoist, bin system and other economizing features, was brought forward. The Duquesne plant of the Carnegie Steel Company, built

in 1895, was commonly referred to as marking an epoch, and before the 'nineties had ended the skip-filled furnace of record-breaking output was represented in every district in the Central West. The same ten years saw the displacement of the puddling furnace by the converter and open hearth furnace at a new pace; the practice of rolling rails without the reheating of the bloom; the displacement of hand labor by cranes in rolling mill finishing departments to an extent that brought protests from workmen in the Pittsburgh district; the rapid building of open hearth steel plant and the much larger use of mild steel; new economies in open hearth furnace charging and in increasing the size of heats; the acquisition of Lake Superior iron mines at relatively low prices by important steel and blast furnace interests, and thus the shifting of a considerable percentage of the steel making capacity of the Central West to a new basis of economic production. It was the decade in which the American steel trade made its first important advance upon the markets of the world—a development only made possible, as was commonly commented on at the time, by the enforced production economies of the lean years following the panic of 1893. The first decade of the new century was noteworthy for the working out of the plan of integration in the industry which had come forward so prominently in 1899 and 1900; but in changes having a bearing on the economical production of steel in the United States the years between 1890 and 1900 were the most important in the history of the industry.

Remarkable Sheet and Tin Plate Production

The full statistics of sheet and tin plate production in 1912 have been compiled by the Bureau of Statistics of the American Iron and Steel Institute, and were presented in these columns a week ago. The gains in both branches of the industry were remarkable. In the past decade our pig iron production has been growing at an average rate of about $5\frac{1}{4}$ per cent. a year and our rolled iron and steel production at an average rate of about $5\frac{3}{4}$ per cent. a year; but last year's sheet production broke its previous record, made in 1910, by almost 30 per cent., while the tin plate production broke the previous record, made in 1911, by 23 per cent. In seven years—the present sheet statistics do not go back of 1905—sheet production has increased 88.9 per cent., or at an average rate of 9.5 per cent. a year, while tin plate production has increased 95.1 per cent., or at the average rate of 10.0 per cent. a year.

The combined output of sheets and black plates for tinning, of gauge 13 and thinner, was 2,839,880 gross tons. Assuming the same rate of gain in the next seven years as has occurred in the past seven, the output of these products in 1919 would be 5,400,000 gross tons. Six years ago, in 1906, the rail output closely approximated 4,000,000 tons, but has not since reached as large a total. Probably, therefore, it will be but a few years until the output of sheets and tin plates exceeds that of rails produced, something that could hardly have been predicted a decade ago.

Some years ago the production of rods was growing at such a rate that predictions were made that eventually it would pass the rail total. Quite possibly it will, but no great glory can result in such case, for in 1912 the sheet and tin plate production passed the rod production, and by nearly 200,000 tons, and fell only 7000 tons

short of passing the structural shape tonnage; indeed, it did pass the production of structural shapes having a 3-in. or greater dimension.

The important finished steel products outside of bars now stand as follows in the order of tonnage: Rails, plates (12 gauge and heavier), shapes (including light shapes), sheets and tin plates, rods, skelp. Official statistics not being compiled, it is impossible to determine whether merchant steel bars should follow or precede plates and shapes; but this is of minor consequence, as were one to include the large production of iron bars, merchant bars would easily head the list. The proportion of rolled iron to rolled steel is considerably smaller in skelp than in bars, and is very small in other rolled products.

For a number of years prior to 1905 the production of sheets was not separated from the production of plates, but in 1905 a classification was instituted which has been maintained to the present. The following table gives the full statistics in gross tons. In the first column is the production of all plates and sheets, including black plates for tinning. The second and third columns segregate this total, as to gauge, drawing the line between 12 and 13 gauge. The next column gives the sheet production, 13 gauge and lighter, with black plates for tinning omitted; the fifth column shows the output of black plates for tinning, and finally the last column shows the production of tin and terne plate made from the black plates already reported.

	Plates, sheets and black plates*	Plates, 12 gauge down	Sheets and black plates, 13 gauge up	Sheets only	Black plates only	Tin and terne plate
1905....	3,532,230	2,041,206	1,491,024	983,437	507,587	493,500
1906....	4,182,156	2,531,552	1,650,604	1,074,525	576,079	577,562
1907....	4,248,832	2,660,060	1,588,772	1,084,700	504,072	514,775
1908....	2,649,693	1,271,021	1,378,672	864,901	513,771	537,087
1909....	4,234,346	2,379,098	1,855,249	1,248,404	606,482	611,959
1910....	4,955,484	2,807,728	2,147,756	1,435,619	712,137	722,770
1911....	4,488,049	2,334,341	2,153,708	1,358,110	795,598	783,960
1912....	5,875,080	3,025,200	2,839,880	1,857,683	982,197	962,971

There were in 1912 in regular operative condition about 400 sheet mills, excluding jobbing mills, making 12 gauge and heavier, also tin mills the product of which is customarily tinned. A fair allowance of idleness for all causes is about 10 per cent., making the average number operated in any one week about 360, while the average output per week was 35,725 gross tons, indicating an average output per mill per week of 100 gross tons, or about 5000 gross tons per mill per year, at full operation, except for two weeks' idleness for repairs, etc. This represents a very large increase in recent years. A similar estimate for the year 1905 falls between 3300 and 3400 tons, which would indicate that there has been an increase of about 50 per cent. in seven years in the average output per mill. Considering the increases that have been made in the weight of mills and in the power furnished, this increase in output is readily understood.

The total number of tin plate mills in regular operative condition in 1912, excluding tin mills which do not coat their product, was about 360, while the average number operated at any one time was about 315, which would indicate an output slightly less than 3000 gross tons of tin plate per mill, operated 50 weeks in the year. Inasmuch as many of the tin plate mills made product which was not tinned, however, the output of a tin plate mill operated exclusively on black plates to be tinned may be taken as a trifle more than 3000 gross tons, with continuous operation except for two weeks

in the year. In the early years of tin plate making in the United States 50 boxes per turn was considered the limit, equal to 1700 to 1800 gross tons a year.

The May Decline in Pig Iron Production

In the interest of statistical accuracy exception must be taken to the statement appearing in several financial columns in the past week that a new record of pig iron production was made in May. It is true that at 2,822,217 tons the output of coke and anthracite iron in the 31 days of May was more than in any other month, but a month is a variable unit, and the May rate of production was but 91,039 tons a day, whereas in April (30 days) it was 91,759 tons a day and in February (28 days), 92,369 tons a day. February was thus the month of high-rate production. March fell off to 89,147 tons because of the floods, and April would have had a higher rate but for the same cause. As our graphic chart of daily pig iron output showed, May was a month of declining production and it is misleading to speak of a new high record when it was due to the length of the month and not to a maximum rate of blast furnace operation. With 13 fewer furnaces in blast June 1 than on May 1 the curtailment of pig iron production is plainly in evidence, and that was the outstanding fact of the pig iron statistics of June 1. What the iron trade looks to these statistics for primarily is the indication they give of new tendencies or a new relation between supply and demand, and a new high rate of output was distinctly not the information given by last week's pig iron figures.

May Copper Production and Stock

The monthly statement of the Copper Producers' Association shows a stock on hand at the end of May of 67,474,225 lb., which is a decrease of 8,074,883 lb. since April. This is the smallest supply carried over into June since last September, when 63,065,587 lb. was the stock remaining. Production in May increased 5,986,014 lb. over April, but deliveries decreased to a greater extent, which accounts for the lower stock on hand. The May statement of the association compares as follows with that of the previous month:

	May, pounds	April, pounds
Stock of marketable copper of all kinds on hand at all points in the United States at first of the month.....	75,549,108	104,269,270
Production of marketable copper in the United States from all domestic and foreign sources during the month.....	141,319,416	135,333,402
Deliveries of marketable copper during the month:		
For domestic consumption.....	81,108,321	78,158,837
For export.....	68,285,978	85,894,727
Total deliveries.....	149,394,299	164,053,564
Stock of marketable copper of all kinds on hand at all points in the United States at the close of the month.....	67,474,225	75,549,108

Domestic consumption increased about 3,000,000 lb. while deliveries for export fell off 17,608,749 lb. The report is said to be about in line with expectations in the trade.

The Otis Steel Company, Cleveland, Ohio, has placed the first contracts in connection with the erection of its new steel plant that will be built in the upper Cuyahoga River Valley in that city. The American Bridge Company has been given a building contract covering about 2,500 tons of steel, principally for the first unit of the finishing mills. The Morgan Engineering Company, Alliance, Ohio, has been given a contract for one three-high 72-in. plate mill in two stands. A contract for three jobbing mills complete went to the William Tod Company, Youngstown, Ohio.

Steel Corporation Orders Fall

A decrease of 654,440 tons in unfilled orders is shown by the United States Steel Corporation's statement for May 31, bringing the total to 6,324,322 tons, or the lowest point since August, 1912, when 6,163,375 tons was reported. The decrease of 654,440 tons in May compares with a decrease of 490,194 tons in April, 187,758 tons in March, 170,654 tons in February and 104,796 tons in January. In December of last year a gain of 79,281 tons was reported, this increase following one of 258,502 tons in November, and of 1,042,874 tons in October. The present total of unfilled orders, 6,324,322 tons, represents a decline of 1,607,842 tons from the high point at the end of 1912. The table below gives the unfilled tonnage for each month back to December 30, 1911, and previous to that for the end of each year:

May 31, 1913.....	6,324,322	October 31, 1911.....	3,694,328
April 30, 1913.....	6,998,762	September 30, 1911.....	3,611,317
March 31, 1913.....	7,468,956	August 31, 1911.....	3,584,085
February 28, 1913.....	7,656,714	July 31, 1911.....	3,695,985
January 31, 1913.....	7,827,368	June 30, 1911.....	3,361,058
December 31, 1912.....	7,932,164	May 31, 1911.....	3,113,187
November 30, 1912.....	7,852,883	April 30, 1911.....	3,218,704
October 31, 1912.....	7,594,381	March 31, 1911.....	3,447,301
September 30, 1912.....	6,551,507	February 28, 1911.....	3,400,543
August 31, 1912.....	6,163,375	January 31, 1911.....	3,110,919
July 31, 1912.....	5,957,079	December 31, 1910.....	2,674,757
June 30, 1912.....	5,807,346	December 31, 1909.....	5,927,031
May 31, 1912.....	5,750,983	December 31, 1908.....	5,603,527
April 30, 1912.....	5,664,885	December 31, 1907.....	4,624,552
March 31, 1912.....	5,304,841	December 31, 1906.....	8,489,719
February 29, 1912.....	5,454,200	December 31, 1905.....	7,605,086
January 31, 1912.....	5,379,721	December 31, 1904.....	4,696,203
December 31, 1911.....	5,084,761	December 31, 1903.....	3,215,123
November 30, 1911.....	4,141,955	December 31, 1902.....	5,347,523

Customs Decisions

Cast-Iron Kettles and Bowls

The United States Court of Customs Appeals has upheld a contention raised by J. W. Sittig relative to the classification, under the present tariff law, of cast-iron kettles and bowls assessed by the collector at the rate of 40 per cent. as "hollowware, enameled or glazed." The importer protested that they were properly dutiable at 1½c. per lb. as "cast-iron hollowware, coated or glazed." The Board of General Appraisers affirmed the collector. The court now reverses the board.

Jute Yarn Machinery

The same court has sustained a contention by Alexander Murphy & Co., Philadelphia, regarding the classification of jute yarn machinery, consisting of squeezers, spreaders, drawing frames, and spinning frames. Duty was assessed by the collector at 45 per cent. under the provision in the law for "manufactures of metal not specially provided for." The importers claimed a rate of 30 per cent. under paragraph 197, which names jute manufacturing machinery. The customs officials maintained that the machinery was capable of use in manufacturing flax yarns and was excluded for this reason from the lower duty under paragraph 197. The board of general appraisers did not agree with this interpretation of the law, and sustained the importers' protest. In affirming the board, the court holds that, while it may be that in commerce and trade, the term "jute machinery" has a limited or social meaning which excludes the appliances in controversy, the burden was on the Government to establish that fact by proper evidence. No such evidence however, was presented and the court states that it must be presumed that the meaning of the term does not differ from that commonly and popularly assigned to it.

A patent was granted May 27, 1913, to J. M. Jenckes on a Corliss type of valve gear for gas engines. This was illustrated and described at some length in *The Iron Age* of October 12, 1911, but at that time the application merely had been made for the patent.

It is stated that 5000 tons of sand is being mined near Burlington, N. J., for shipment to the Government's steel foundry in Panama; the sand on the Isthmus is not suitable for foundry purposes.

The railroads of Missouri have decided to invoke the referendum regarding the train crew legislation of that State and are circulating a petition for a vote by the people on the merits of the dispute.

Buffalo Machinists' Strike Ended

All of the machine shops in Buffalo are again running, and with two or three exceptions are manned with their full force. In these exceptional cases the places of the old employees who have not returned have been or are being filled by out-of-town men. Of the men who struck only a few stragglers are still hanging back. The strikers returned to work without gaining any of the contested points, namely, recognition of the union, the 50-hr. week or the establishment of a minimum wage. The employers, however, have agreed to treat with the men as employees, without the intervention of business agents or representatives of the union, whenever occasion arises, upon all questions respecting wages and the adjustment or rectification of complaints and grievances.

According to a report of the German Consul General at Capetown, South Africa, iron ore deposits of great extent have been discovered in Cape Colony. This is to be investigated by the mining department of the South African government. The deposits are said to be located in Griqualand West, in a westerly direction from Kimberly, and at a considerable distance from the railroad.

The Allen-Scales Engineering Company, Inc., Stahlman Building, Nashville, Tenn., announces the reorganization of its business as contractor for the installation of heating and ventilating apparatus and mechanical equipment, including power plants. D. C. Scales is president; Verner Tolmie, vice-president; E. P. Scales, general manager; W. Harwell Allen, secretary and treasurer.

It is expected that eventually the Siberian Karagandy coal mine of the Spassky Copper Mine, Ltd., of London, will be connected with the main Siberian railroad system. It is estimated to contain about 400 million tons of coal and some of the largest iron deposits of western Siberia are near it, assuring an important source of supply of both coal and iron in the future.

Notices have been posted in the Pope plant of the Phillips Sheet & Tin Plate Company at Steubenville, Ohio, that its contract with the Amalgamated Association will terminate July 1, after which the mill will operate as an open plant the same as the company's Weirton and Clarksburg plants. Employees who desire positions must apply before June 16.

Oriskany furnace of the Oriskany Ore & Iron Corporation, Lynchburg, Va., was lighted June 1, but was delayed in operation by an explosion at the top. After repairs, blast was put on June 9 and the first cast was made that day. Rogers, Brown & Co. are exclusive selling agents for the output of this furnace.

The Chambersburg Engineering Company, Chambersburg, Pa., is mailing to its trade a very attractive wall calendar, covering June, 1913-1914. In addition to the calendar pad an illustration is given of one of its large steam drop hammers. A copy of the calendar may be had by addressing the company.

The Deforest Sheet & Tinplate Company, Niles, Ohio, will add a jobbing mill for making blue annealed sheets, 10 gauge and lighter, up to 48 in. wide. Four sheet mills are to be added, which will make 10 in all, and a low pressure turbine for a 1250-kw. generator is to be installed.

Structural workers in Milwaukee on strike from April 1 to June 5 have returned to work under a new contract with employees which is to run three years. They will receive an advance from 56½c. an hour to 62½c. for the first year and 65c. for the two succeeding years.

On the application of A. H. Jackson, president Fremont Furnace Company, Fremont, Ohio, the company has been placed in the hands of a receiver. J. W. Pero was appointed receiver. The company's troubles are said to be due to a lack of capital.

A British battleship-cruiser is being built to have a speed of no less than 29 knots per hour. The Babcock & Wilcox Company is to furnish the 87,000-h.p. in boilers required.

The Iron and Metal Markets

Premiums Fast Disappearing

A More Rapid Gain on Order Books

Structural Outlook Favorable—Some Falling Off in Pig Iron Consumption

The steel companies generally are gaining on the large volume of business on their books at an accelerated rate. Hence premiums for early delivery, which have been a factor in the trade for nearly a year, are fast disappearing. In a number of lines the amount of business on which higher than contract prices has to be paid is nearly negligible.

That the recession in new orders has not been uniform is indicated by the report of Steel Corporation bookings in the first week in June at the rate of about 30,000 tons a day, whereas in May the average was between 21,000 and 22,000 tons a day. The statement for May 31 showed a falling off last month from the bookings of April of somewhat less than the 200,000 tons that had been estimated. The reduction in unfilled orders thus became 654,000 tons, against 490,000 tons in April.

No condition has arisen as yet to test the solidity of the contracts the steel companies have in hand. Consumption is very heavy and no cancellations are reported apart from the few heretofore noted in bars. In plate, structural and bar products the mills apparently will not need to be aggressive for new business for some months.

How far hesitancy due to tariff changes is a factor is not clear; it is particularly evident on the Pacific coast, where buying is nearly nil, the belief being general that under the new duties that section will become part of the markets of the world.

The outlook for structural mills is favorable, a number of large projects coming up in various parts of the country. For Memphis and Louisville bridges and the Kansas City terminal, for example, 50,000 tons will be needed. The East Chicago plant of the Baldwin Locomotive Works will require 7500 tons. At Cleveland 2500 tons has been let for the new Otis Steel Company buildings. In New York a new contract has finally been signed for the Equitable Building. Bids will be opened June 14 for the Panama coaling stations, calling for 10,000 tons.

The market for plates shows that early deliveries can be had at 1.45c., Pittsburgh, from some mills, while others ask 1.50c. On this product the Eastern mill premiums long prevalent have been scaled down substantially. Shipyard prospects are bright; much interest is taken in the East in bids for the six 10,000-ton Hamburg-American vessels for the Panama trade.

For South America rail sales amounting to 17,000 tons are reported. Export trade has not escaped the effects of disturbed conditions in European money and securities markets, but consumers will welcome the change in so far as it facilitates deliveries long held up.

The Standard Oil Company has just placed 50,000 boxes of oil sizes of tin plates with Welsh mills for July shipment. In the domestic market specifications have been falling off and the outlook for continued full operation of mills is not so favorable.

Sheet prices show further cutting, indicating that

new capacity is still not fully occupied. On black sheets 2.25c. for No. 28 has been done and galvanized sheets are now more generally sold at a 1-cent differential in view of the reductions in spelter.

Pig iron buyers seem not convinced that they have seen the end of the steady yielding of prices. Inquiry is greater but only a small proportion ends in sales. Signs of a falling off in consumption are indicated in some districts, Chicago reporting that a number of users of castings are specifying at the minimum rather than the expected maximum rate on their contracts. Basic iron has sold at \$14.50 Valley, and No. 2 foundry at \$14, the latter price being made on part of the Westinghouse contract for 15,000 tons. Southern iron may have sold below \$11 as reported, but the market is far from active.

The city of Hartford, Conn., will take bids next week on 15,000 tons of 42-in. cast-iron pipe. On 5000 tons for Los Angeles, Cal., and 2100 tons for Akron, Ohio, the leading maker was low bidder.

Heavy offerings by the railroads added to the load it has long been carrying have well nigh demoralized the scrap market, prices on some descriptions having declined 50 to 75 cents in a single week.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type. Declines in Italics

At date, one week, one month, and one year previous.

Pig Iron, Per Gross Ton:	June 11, 1913.	June 4, 1913.	May 14, 1913.	June 12, 1912.
Foundry No. 2 X, Philadelphia.	\$16.25	\$16.50	\$16.75	\$15.25
Foundry No. 2, Valley furnace.	14.00	14.25	14.50	13.25
Foundry No. 2, S'th'n, Cin'ti...	14.25	14.25	15.00	14.25
Foundry No. 2, Birmingham, Ala.	11.00	11.00	11.75	11.00
Foundry No. 2, furnace, Chicago*	16.00	16.00	16.00	14.50
Basic, delivered, eastern Pa....	16.00	16.50	16.50	15.25
Basic, Valley furnace.....	14.50	14.50	15.35	13.00
Bessemer, Pittsburgh.....	17.25	17.50	17.90	15.15
Malleable Bessemer, Chicago*...	16.00	16.00	16.00	14.50
Gray forge, Pittsburgh.....	14.65	14.90	15.40	13.90
Lake Superior charcoal, Chicago	16.75	17.50	18.00	16.25

Billets, etc., Per Gross Ton:

Bessemer billets, Pittsburgh....	26.50	26.50	28.00	20.50
Open hearth billets, Pittsburgh..	26.50	26.50	28.50	20.50
Open hearth sheet bars.....	27.00	27.00	29.50	21.50
Forging billets, Pittsburgh.....	34.00	34.00	36.00	28.00
Open hearth billets, Philadelphia	28.00	28.00	28.00	23.40
Wire rods, Pittsburgh.....	30.00	30.00	30.00	25.00

Old Material, Per Gross Ton:

Iron rails, Chicago.....	15.25	15.75	16.00	16.00
Iron rails, Philadelphia.....	17.50	18.00	18.00	16.50
Carwheels, Chicago.....	13.50	14.25	14.75	14.25
Carwheels, Philadelphia.....	13.00	13.50	13.50	13.50
Heavy steel scrap, Pittsburgh....	12.50	13.00	13.50	13.50
Heavy steel scrap, Chicago.....	10.00	10.50	11.25	12.00
Heavy steel scrap, Philadelphia.	12.00	12.00	12.00	13.50

Finished Iron and Steel,

Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill..	1.25	1.25	1.25	1.25
Iron bars, Philadelphia.....	1.57½	1.57½	1.57½	1.30
Iron bars, Pittsburgh.....	1.65	1.70	1.70	1.25
Iron bars, Chicago.....	1.50	1.50	1.57½	1.27½
Steel bars, Pittsburgh.....	1.40	1.40	1.40	1.20
Steel bars, New York.....	1.56	1.56	1.56	1.36
Tank plates, Pittsburgh.....	1.45	1.45	1.45	1.25
Tank plates, New York.....	1.61	1.61	1.61	1.41
Beams, Pittsburgh.....	1.45	1.45	1.45	1.25
Beams, New York.....	1.61	1.61	1.61	1.41
Angles, Pittsburgh.....	1.45	1.45	1.45	1.25
Angles, New York.....	1.61	1.61	1.61	1.41
Skelp, grooved steel, Pittsburgh	1.45	1.45	1.45	1.20
Skelp, sheared steel, Pittsburgh	1.50	1.50	1.50	1.25
Steel hoops, Pittsburgh.....	1.60	1.60	1.60	1.25

Sheets, Nails and Wire,

Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	2.30	2.30	2.30	1.90
Wire nails, Pittsburgh.....	1.80	1.80	1.80	1.60
Cut nails, f.o.b. Eastern mills...	1.80	1.80	1.80	1.60
Cut nails, Pittsburgh.....	1.70	1.70	1.70	1.55
Fence wire, ann'd, 0 to 9, Pgb.	1.60	1.60	1.60	1.40
Barb wire, galv., Pittsburgh....	2.20	2.20	2.20	1.90

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

	June 11, 1913.	June 4, 1913.	May 14, 1913.	June 12, 1912.
Coke, Connellsville, Per Net Ton, at Oven:				
Furnace coke, prompt shipment	\$2.15	\$2.15	\$2.20	\$1.90
Furnace coke, future delivery..	2.25	2.25	2.25	2.25
Foundry coke, prompt shipment	2.85	2.85	2.85	2.40
Foundry coke, future delivery..	3.00	3.00	2.90	2.40

Metals.				
Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.....	15.75	15.75	16.00	17.50
Electrolytic copper, New York..	15.25	15.25	15.75	17.37½
Spelter, St. Louis	5.00	5.15	5.35	6.75
Spelter, New York.....	5.15	5.30	5.50	6.90
Lead, St. Louis	4.20	4.20	4.20	4.37½
Lead, New York	4.35	4.35	4.35	4.50
Tin, New York.....	45.00	46.60	49.62½	47.37½
Antimony, Hallett, New York..	8.20	8.20	8.25	7.87
Tin plate, 100-lb. box, Pittsburgh	\$3.60	\$3.60	\$3.60	\$3.40

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets, Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.45c. to 1.50c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼ in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft., down to the weight of 3-16 in., take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.....	.10
Gauges under 3-16 in. to and including No. 2.....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10.....	.30
Gauges under No. 10 to and including No. 12.....	.40
Sketches (including straight taper plates) 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over.....	.20
Boiler and flange steel .....	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel .....	.30
Marine steel .....	.40
Locomotive firebox steel .....	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.	1.00
Cutting to lengths, under 3 ft., to 2 ft. inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.45c. to 1.50c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.....	.10
H-beams over 18 in.....	.10
Angles over 6 in. on one or both legs.....	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909.....	.70
Tees, structural sizes (except elevator, hand rail, car-truck and conductor rail) .....	.05
Angles, channels and tees, under 3 in. wide as per steel bar card, Sept. 1, 1909.....	.20 to .80
Deck beams and bulb angles .....	.30
Hand rail tees .....	.75
Cutting to lengths, under 3 ft., to 2 ft. inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55
No charge for cutting to lengths 3 ft. and over.	

Wire Rods and Wire.—Bessemer, open-hearth and chain rods, \$30. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, \$1.60; galvanized, \$2. Galvanized barb wire, to jobbers, \$2.20; painted, \$1.80. Wire nails, to jobbers, \$1.80.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.							
Nos.	0 to 9	10	11	12 & 12½	13	14	15
Annealed	\$1.75	\$1.80	\$1.85	\$1.90	\$2.00	\$2.10	\$2.20
Galvanized	2.15	2.20	2.25	2.30	2.40	2.50	2.60

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel

pipe (full weight) in effect from May 27, 1913, iron pipe (full weight), from June 2, 1913:

Steel.				Iron.			
Inches.	Black.	Galv.		Inches.	Black.	Galv.	
¾, 1 and 1½.....	72	51½	¾ and 1.....	66	47		
1½.....	76	65½	1½.....	65	46		
2 to 3.....	79	70½	2 to 2½.....	69	56		
				¾ to 2½.....	72	61	
Butt Weld.							
				Lap Weld.			
2.....	76	67½	1½.....	56	45		
2½ to 6.....	78	69½	1½.....	67	56		
7 to 12.....	75	64½	2.....	68	58		
13 to 15.....	52	..	2½ to 4.....	70	61		
				4½ to 6.....	70	61	
				7 to 12.....	68	55	
Reamed and Drifted.							
1 to 3, butt.....	77	68½	1 to 1½, butt.....	70	59		
2, lap.....	74	65½	2, butt.....	71	60		
2½ to 4, lap.....	76	67½	1½, lap.....	54	43		
				1½, lap.....	65	54	
				2, lap.....	66	56	
				2½ to 4, lap.....	68	59	
Butt Weld, extra strong, plain ends.							
¾, 1 and 1½.....	67	56½	¾.....	63	52		
1½.....	72	65½	1½.....	67	60		
¾ to 1½.....	76	69½	¾ to 1½.....	71	62		
2 to 3.....	77	70½	2 and 2½.....	72	63		
Lap Weld, extra strong, plain ends.							
2.....	73	64½	1½.....	65	59		
2½ to 4.....	75	66½	2.....	66	58		
4½ to 6.....	74	65½	2½ to 4.....	70	61		
7 to 8.....	67	56½	4½ to 6.....	69	60		
9 to 12.....	68	51½	7 and 8.....	63	53		
				9 to 12.....	58	47	
Butt Weld, double extra strong, plain ends.							
¾.....	62	55½	¾.....	57	49		
¾ to 1½.....	65	58½	¾ to 1½.....	60	52		
2 to 2½.....	67	60½	2 and 2½.....	62	54		
Lap Weld, double extra strong, plain ends.							
2.....	63	56½	2.....	55	49		
2½ to 4.....	65	58½	2½ to 4.....	60	54		
4½ to 6.....	64	57½	4½ to 6.....	59	53		
7 to 8.....	57	46½	7 to 8.....	52	42		

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads on lap-welded steel, in effect from May 29, 1913, and standard charcoal-iron boiler tubes, in effect from January 1, 1913, are as follows:

Lap-Welded Steel.	Standard Charcoal Iron.
1½ and 2 in.....	60
2½ in.....	57
2½ and 2¾ in.....	63
3 and 3½ in.....	67
3½ and 3¾ in.....	69
5 and 6 in.....	63
7 to 13 in.....	60
1½ in.	1½ in.
2½ in.	2½ in.
3 and 3½ in.....	3 and 3½ in.....
3½ and 3¾ in.....	3½ and 3¾ in.....
5 and 6 in.....	5 and 6 in.....
7 to 13 in.....	7 to 13 in.....

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2½ in. and larger, over 22 ft., 10 per cent. net extra.
Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.	Cents per lb.
Nos. 3 to 8.....	1.70
Nos. 9 and 10.....	1.75
Nos. 11 and 12.....	1.80
Nos. 13 and 14.....	1.85
Nos. 15 and 16.....	1.95

Box Annealed Sheets, Cold Rolled.	Cents per lb.
Nos. 10 and 11.....	1.95 to 2.00
No. 12.....	1.95 to 2.00
Nos. 13 and 14.....	2.00 to 2.05
Nos. 15 and 16.....	2.05 to 2.10
Nos. 17 to 21.....	2.10 to 2.15
Nos. 22 and 24.....	2.15 to 2.20
Nos. 25 and 26.....	2.20 to 2.25
No. 27.....	2.25 to 2.30
No. 28.....	2.30 to 2.35
No. 29.....	2.35 to 2.40
No. 30.....	2.45 to 2.50

Galvanized Sheets of Black Sheet Gauge.	Cents per lb.
Nos. 10 and 11.....	2.40 to 2.50
No. 12.....	2.50 to 2.60
Nos. 13 and 14.....	2.50 to 2.60
Nos. 15 and 16.....	2.65 to 2.75
Nos. 17 to 21.....	2.80 to 2.90
Nos. 22 and 24.....	2.95 to 3.05
Nos. 25 and 26.....	3.10 to 3.20
No. 27.....	3.25 to 3.35
No. 28.....	3.40 to 3.50
No. 29.....	3.55 to 3.65
No. 30.....	3.70 to 3.80

Pittsburgh

PITTSBURGH, PA., June 10, 1913.

With a further falling off in specifications against contracts, estimates are that they now represent from 60 to 75 per cent. of output. The most notable falling off has been in sheets, tin plate, steel bars and wire products. The car shops are well filled for three or four months and leading fabricating interests have actual orders to take their output up to October or later, so that specifications for plates and shapes are holding up well. Contract prices on all kinds of finished iron and steel, with the exception of wire products, shafting and possibly sheets, are reported firm, and this condition reflects clearly the filled condition of the mills, which are running almost entirely on specifications, the amount of new buying all of this year having been quite light. More movement is noted in pig iron, but lower prices are made. Not much new inquiry is out for billets or sheet bars, and deliveries are easier, consumers getting their steel more promptly than for some months. So far negotiations for furnace coke for last half delivery have had no result, furnace operators believing coke will be lower later on. The point is now being made that as there has been so little new buying in anything so far this year, with consumption going on at an enormous rate, a great deal of business is being held up that may be expected to come out later in the year, but possibly not before the fourth quarter.

Pig Iron.—The statement in this report last week that the average price of pig iron in May was \$16 should have read \$16.788 at Valley furnace. Last Friday the Westinghouse Electric & Mfg. Company placed contracts for about 15,000 tons of foundry iron, 9000 tons for its Cleveland works and about 6000 tons for its Allegheny plant. A good part of the Cleveland iron will be shipped from a Cleveland furnace and a good part of the Allegheny iron will be shipped from Josephine, Pa., with a freight rate of 75c. to Allegheny. Prices paid were on an average of \$14 at Valley furnace for No. 2 foundry or \$14.90 delivered Pittsburgh. The Colonial Steel Company has placed with a local dealer 500 tons of basic iron for June delivery at \$14.50, maker's furnace, not to exceed 0.02 in sulphur. Shipments on this contract started on Monday. The same company has decided to defer for the time being its intended purchase of 1000 to 1500 tons per month for June to September. Last week the Republic Iron & Steel Company closed a deal with M. A. Hanna & Co., Cleveland, for 10,000 tons of Bessemer iron per month over last half of the year, to be shipped from West Middlesex, Pa., to Youngstown. The buyer will give the seller about 120,000 tons of Bessemer ore from its Beaver mine to make 60,000 tons of this Bessemer iron, so that the transaction is really a conversion deal, the seller getting pay for smelting the ore. Had this deal not been closed it was probable that the furnace at West Middlesex would shut down shortly. Some inquiries are in the market for fairly large lots of Bessemer and basic. The Union Switch & Signal Company is in the market for 500 to 1000 tons of foundry iron for prompt shipment. Small foundries are buying fair-sized lots of iron, but most of it is for reasonably prompt shipment, consumers not being inclined to buy much ahead on account of the uncertainty as to prices. We quote Bessemer iron at \$16.25 to \$16.35; basic, \$14.50; malleable Bessemer, \$14.25 to \$14.50; No. 2 foundry, \$14 to \$14.25, and gray forge, \$13.75 to \$14, all at Valley furnace, the freight rate to the Pittsburgh district being 90c. a ton.

Billets and Sheet Bars.—In May the Carnegie Steel Company passed practically the same tonnage in billets, sheet bars and steel rails in its order department as in April, making it one of the heaviest months in the history of the company. There is a fair amount of new inquiry for billets and sheet bars for third quarter, but most consumers are covered by regular contracts. We continue to quote Bessemer and open-hearth billets for June shipment, and also for third quarter delivery, at \$26.50 to \$27 and Bessemer and open-hearth sheet bars for same deliveries at \$27 to \$27.50, maker's mill, Youngstown or Pittsburgh. We quote forging billets \$34 to \$35 and axle billets \$33 to \$34, Pittsburgh.

Ferroalloys.—An occasional order is taken for a carload or two of ferromanganese for prompt shipment, which brings from \$59 to \$59.50, Baltimore. It is stated that the official price of \$61 on ferromanganese for last half is being firmly held. We quote 80 per cent. English ferromanganese at \$60 to \$60.50, Baltimore, the freight rate to the Pittsburgh district being \$2.16 per ton. We quote 50 per cent. ferro-silicon, in lots up to 100 tons, at \$75; over 100 tons to 600 tons, \$74; over 600 tons, \$73, Pittsburgh. We

quote 10 per cent. at \$24; 11 per cent., \$25; 12 per cent., \$26, f.o.b. cars at furnace, Jackson, Ohio, or Ashland, Ky. We quote ferro-carbon-titanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, 12½c. in lots up to 2000 lb.

Wire Rods.—The demand is quiet, and specifications against contracts are only fair. Prices are weaker and there are intimations that \$29 at mill has been done. We quote Bessemer, open hearth and chain rods at nominally \$30, Pittsburgh.

Muck Bar.—More inquiry is in the market than for a long time, due to fear of consumers that a shut down of the mills making muck bar may possibly come on July 1. A sale is reported of about 1000 tons of high grade muck bar for June delivery at about \$31, delivered buyer's mill in the Pittsburgh district. We quote standard grades of local muck bar, made from all pig iron, at \$30.50 to \$31, Pittsburgh. Eastern muck bar is still being offered in this market at \$28 to \$29 delivered.

Skelp.—Prices on grooved and sheared iron skelp are slightly weaker, and we have reduced our quotations \$1 a ton. The skelp mills are, however, pretty well filled for the next two or three months and new inquiry is fairly heavy. We quote: Grooved steel skelp, 1.45c. to 1.50c.; sheared steel skelp, 1.50c. to 1.55c.; grooved iron skelp, 1.70c. to 1.75c.; sheared iron skelp, 1.80c. to 1.85c.; all delivered to buyers' mills in the Pittsburgh district.

Steel Rails.—The Carnegie Steel Company continues to book orders for small lots of standard sections ranging from 200 to 1000 tons, and received specifications against contracts last week for about 25,000 tons of standard sections. The new demand for light rails is better, that company having received new orders and specifications last week for about 3500 tons. Track fastenings are in active demand and shipments are heavy. We quote splice bars at 1.50c. per lb. and standard section rails at 1.25c. per lb. Light rails are quoted as follows: 25, 30, 35, 40 and 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Structural Material.—Inquiry is reported better and a fair amount of new work was placed the past week. The American Bridge Company took a contract for a new city hall at Youngstown, Ohio, 660 tons, and about 3200 tons for the Washington Hotel at Detroit, Mich. Local work coming up includes fully 10,000 tons for the new hotel to be built on Smithfield street, and which now seems assured, and 12,000 to 15,000 tons for new municipal buildings to be erected by the city of Pittsburgh on the block bounded by Diamond and Ross streets, Fourth avenue and Grant street. The Jones & Laughlin Steel Company has taken 300 tons of steel for a pulp mill to be erected at West Point, Va., and the McClintic-Marshall Construction Company has taken 400 to 500 tons for small bridges to be built by the Pennsylvania Railroad East. We quote beams and channels up to 15 in. at 1.45c. to 1.50c. Small lots from warehouse for prompt delivery are bringing from 1.60c. up, depending on the size of the order and the deliveries wanted.

Plates.—It is reported that the 42-in. pipe line for the Winnipeg water works system is again in the market and will take upward of 15,000 tons of plates. The coal unloading stations to be built by the Government at the Panama Canal, bids on which are to be opened June 14, will take upward of 10,000 tons of plates and a new water line for the city of Hartford, Conn., 3700 tons, is also in the market. The Standard Steel Car Company and the Pressed Steel Car Company have placed orders for 40,000 to 50,000 tons of plates and shapes with local mills to cover contracts for steel cars recently taken. Local plate mills report they still have orders on their books to take their output for three to four months. The supply of plates for reasonably prompt shipment is better, some mills now taking contracts and promising deliveries in three weeks from date of order. On such orders 1.50c. to 1.60c. Pittsburgh is being quoted, while for forward delivery the leading plate makers are still quoting 1.45c. at mill.

Iron and Steel Bars.—Specifications against contracts for steel bars continue fairly heavy, but not as active as in May. A few consumers having large contracts running to the end of the year are reported to have cut down the tonnage but actual cancellations are reported very light so far. It is evident, however, that some consumers regard the outlook with uneasiness and are not going to take bars faster than absolutely necessary to meet actual needs. While the new demand is light, most of the steel bar mills have orders covering

their entire output to October 1. The Republic Iron & Steel Company has little to sell for fourth quarter delivery. The demand for iron bars is lighter and prices are slightly lower. For forward delivery steel bars are firm at 1.40c. at mill, but for shipment in three to four weeks prices from warehouse and other sources of supply are slightly lower than they have been. We quote iron bars at 1.65c. to 1.70c. for delivery in six to eight weeks. The mills continue to charge \$1 extra per ton for twisting 3/4-in. and larger steel bars and \$2 extra for 1/2 to 3/8 in.

Sheets.—The demand is light and specifications show a material falling off as compared with May. As yet no cancellations of contracts are reported, but some consumers are not taking their full quota and indications are that both jobbers and consumers intend to confine specifications and new orders to meet actual needs. Reports are current that in one or two cases No. 28 gauge galvanized sheets have sold on the basis of \$3.25. A leading mill reports that it is still filled up for 22 weeks on blue annealed sheets and from 12 to 14 weeks on Bessemer black and galvanized. The American Sheet & Tin Plate Company is operating this week to 77 per cent. of capacity of its sheet mill products. We quote No. 10 blue annealed sheets at 1.75c.; No. 28 Bessemer black sheets, 2.30c. to 2.35c.; No. 28 galvanized at 3.40c. to 3.50c., and No. 28 tin mill black plate at 2.30c. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

Tin Plate.—Makers continue to report a falling off in specifications and the outlook for the immediate future is somewhat dubious. Unless a material increase occurs in specifications, it is probable that a slowing down in operations will have to be made. This may enable some of the mills to make repairs in July that have long been put off. The supply of steel is reported better, there now being little delay in operations on this account, except with the American Sheet & Tin Plate Company, which is operating to but 84 per cent. of its hot tin mill capacity. The new demand for tin plates is for small lots only. We quote 100-lb. cokes at \$3.60; 100-lb. ternes at \$3.45, and No. 28 black plate for tinning purposes at \$2.30, all f.o.b. Pittsburgh.

Bolts and Rivets.—Local conditions in the bolt and rivet trade are fairly satisfactory, the new demand being moderate, while specifications are reasonably good. One leading maker reports actual orders in hand for 45 days and another for about five weeks. In other sections of the country conditions are not so good and rivet prices are being shaded about \$2 a ton and bolts from 5 to 7 1/2 per cent. Regular prices on button head structural rivets are \$2.20 and on cone head boiler rivets \$2.30. Regular discounts on bolts are as follows, in lots of 300 lb. or over delivered within a 20c. freight radius of maker's works:

Coach and lag screws	80 and 10% off
Small carriage bolts, cut threads.....	.75 and 5% off
Small carriage bolts, rolled threads.....	.75 and 10% off
Large carriage bolts .....	.70% off
Small machine bolts, cut threads.....	.75 and 10% off
Small machine bolts, rolled threads.....	.75, 10 and 5% off
Large machine bolts .....	.70 and 7% off
Machine bolts with C.P.C. and T nuts, small.....	.75 and 5% off
Machine bolts with C.P.C. and T nuts, large.....	.70% off
Square hot pressed nuts, blanked and tapped.....	\$5.70 off list
Hexagon nuts	\$6.30 off list
C.F.C. and R. square nuts, tapped and blank.....	\$5.70 off list
Hexagon nuts, 3/4 and larger	\$6.60 off list
Hexagon nuts smaller than 3/4.....	\$7.20 off list
C.P. plain square nuts	\$5.20 off list
C.P. plain hexagon nuts	\$5.50 off list
Semi-finished hexagon nuts 3/4 and larger.....	.85% off
Semi-finished hex. nuts smaller than 3/4.....	.85 and 10% off
Rivets, 7/16 x 6 1/2, smaller and shorter.....	.75, 10 and 10% off
Rivets, metallic tinned, bulk.....	3 1/2c. per lb. net extra
Rivets, tin plated, bulk.....	1 1/2c. per lb. net extra
Rivets, metallic tinned, packages.....	.70, 10 and 10% off
Standard cap screws .....	.75, 10, 10 and 7 1/2% off
Standard set screws .....	.75, 10, 10 and 7 1/2% off

Railroad Spikes.—Orders are confined to small lots and specifications have fallen off. Little trouble is had in getting reasonably prompt deliveries on railroad and boat spikes, and low prices on railroad spikes continue to be made in the West, notably at St. Louis and Chicago. We quote railroad spikes in base sizes, 5 1/4 x 9/16 in., at \$1.75 to \$1.80, and small railroad and boat spikes in carload and larger lots at \$1.80 to \$1.85 per 100 lb., f.o.b. Pittsburgh.

Wire Products.—The incorrect report current last week of a reduction in prices of wire products of \$1 a ton was taken by the trade as an indication of what may possibly be looked for in the near future. The demand for wire and wire nails is dull, and specifications are light and unsatisfactory. Jobbers and consumers are not taking in more than necessary to meet actual needs. Regular prices, which are shaded about \$1 a ton, are as

follows: Wire nails, \$1.80, base, per keg; cut nails, \$1.70 to \$1.75; galvanized barb wire, \$2.20 per 100 lb.; painted, \$1.80; annealed fence wire, \$1.60, and galvanized fence wire, \$2, f.o.b. Pittsburgh, usual terms, freight added to point of delivery. Jobbers charge the usual advances over these prices for small lots from store.

Shafting.—The statement in this report last week that shafting had sold at 62 per cent. off list is strongly denied by some of the makers, who claim that 60 is the best that has been done. The new demand is only fair, and specifications have fallen off considerably. We quote cold rolled shafting at 60 per cent. off in carload and larger lots and 55 per cent. in small lots delivered in base territory.

Merchant Pipe.—Makers of iron oil country goods have made the same advance in prices as were recently made in steel, and the market on such goods is reported firm, with demand active. The new demand for butt weld pipe is quiet, but on lap weld sizes is heavy, and the mills are filled for two or three months. The Ohio Fuel Supply Company has bought eight miles of 12 in. steel pipe from a Youngstown mill. A leading mill reports that its actual orders so far this month on steel pipe are about 10 per cent. heavier than in the same period in May. No large gas or oil lines are in the market, most of these having already been placed, and the mills that make large pipe are filled up to October or later. The new discounts on both iron and steel pipe are reported as being firmly held.

Boiler Tubes.—The demand for locomotive tubes continues unusually heavy, a leading mill stating that its orders will take its entire output for the next four months. On seamless tubing, one mill reports being sold up for 22 weeks. The mills making charcoal iron tubes are also very busy. The iron and steel tube mills will probably run to full capacity to October or later. The discounts on both iron and steel boiler tubes are being firmly held.

Old Material.—Further heavy declines in prices have taken place, and turnings have reached the lowest figures in the history of the scrap trade. It is understood that the Carnegie Steel Company bought all the heavy steel scrap in the lists of the Pennsylvania Railroad and the Pennsylvania Lines West and has also bought scrap from dealers. An embargo has been declared on the scrap routed for the South Side mills of the Jones & Laughlin Steel Company. We have again reduced prices from 25 to 50c. per ton. The mills seem congested, and leading dealers are not trying to make sales under present conditions. Dealers are now quoting as follows, per gross ton, for delivery in Pittsburgh and nearby districts:

Heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery	\$12.50 to \$12.75
No. 1 foundry cast	12.75 to 13.00
No. 2 foundry cast	11.50 to 11.75
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	8.50 to 8.75
Re-rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	14.50 to 14.75
No. 1 railroad malleable stock	11.50 to 11.75
Grate bars	8.75 to 9.00
Low phosphorus melting stock	15.50 to 15.75
Iron car axles	24.50 to 25.00
Steel car axles	17.50 to 17.75
Locomotive axles, steel	21.00 to 21.50
Locomotive axles, iron	25.50 to 26.00
No. 1 busheling scrap	12.00 to 12.25
No. 2 busheling scrap	7.50 to 7.75
Old carwheels	14.00 to 14.25
*Machine shop turnings	6.50 to 6.75
*Cast-iron borings	8.25 to 8.50
†Sheet bar crop ends	14.00 to 14.25
Old iron rails	14.50 to 14.75
No. 1 railroad wrought scrap	13.75 to 14.00
Heavy steel axle turnings	9.00 to 9.25
Stove plate	8.50 to 8.75

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.

†Shipping point.

Coke.—It is reported that the contract of the Pittsburgh Steel Company made recently with a prominent Connellsville coke operator was for 35,000 tons of coke per month over an extended period, and the price was slightly under \$2.25 per net ton at oven. Shipments will hardly start before August 1. Negotiations are on between coke makers and furnace operators for last half coke, but nothing has been done, the furnacemen having decided to wait and perhaps to buy coke for some little time from month to month. While \$2.50 has been talked of a good deal as the price of furnace coke for last half at least, two operators would sell standard makes at \$2.25, but furnace interests do not seem disposed to pay even this price. The Algoma Steel Company has bought 3000 tons of Connellsville furnace coke

for June shipment at \$2.15 at oven, and we note other sales of 8000 to 10,000 tons at \$2.15 to \$2.20. Prices on furnace coke for prompt shipment are slightly weaker. The new demand for foundry coke for prompt shipment is quiet, and most consumers are covered on their needs for last half. We quote standard makes of Connellsville furnace coke for prompt delivery at \$2.15 to \$2.20 per net ton at oven and 72-hr. foundry coke at \$2.75 to \$2.85 for prompt shipment and about \$3 for forward delivery. The Connellsville Courier reports the output of coke in the Upper and Lower Connellsville regions last week as 401,321 tons, an increase over the previous week of 4417 tons.

Chicago

CHICAGO, ILL., June 11, 1913.—(By Telegraph.)

Individual instances of buying whether of finished steel, pig iron or scrap are but incidents in a general low barometer situation. The hope is general that the corrective influences now at work will re-establish activity before the present movement has gone very far. Liquidation and retrenchment in finance accompany a reduction of producing capacity in pig iron. Among finished steel products the outlook is most promising for structural steel with an important aggregate of tonnage in sight and current buying in small lots fairly active. In other lines the market is featureless as regards new orders. Those who seek evidence of softening in prices will find it in the sheet trade and in bar iron. Current prices for most of the other steel products have been conservative and will doubtless continue even through a period of moderate buying. The feature of the pig iron market is the blowing out of furnaces or preparations therefor, both in this district and in the South. There has been some buying of Northern iron but so scattered as to be without great significance. The oversupply of scrap in this market continues to force prices down and there are those who believe that the diverging courses of the prices of finished material and scrap for some months can only be explained by some fundamental changes in relative values.

Pig Iron.—Several sales of Northern iron, both for gray iron and malleable work, are reported for the past week. Inquiries are numerous and some very low quotations, f.o.b. furnace, particularly for malleable, are being named, but the sum total of activity is not great. Iron from the South is in even less demand. Foundries which six weeks ago were anticipating that the maximum tonnages would be taken out on castings contracts are finding that the minimum quantity only is being specified. The melt is accordingly materially reduced from the rate of 60 days ago and the demand for iron for third quarter consumption is not so pressing. In this district one Mayville stack has been blown out and one Federal and one Iroquois are to be blown out before the end of the month. The price of charcoal iron has declined in a marked degree, although some of the furnaces are still refusing to accept business at less than \$17.50, Chicago. The Southern market appears to be offering some resistance to declines below the current basis of \$11, Birmingham. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 1, 2, 3, 4.....	\$16.75 to \$17.50
Northern coke foundry, No. 1.....	16.75 to 17.25
Northern coke foundry, No. 2.....	16.00 to 16.75
Northern coke foundry, No. 3.....	15.50 to 16.00
Southern coke, No. 1 foundry and No. 1 soft.....	15.85 to 16.35
Southern coke, No. 2 foundry and No. 2 soft.....	15.35 to 15.85
Southern coke, No. 3.....	14.85 to 15.35
Southern coke, No. 4.....	14.35 to 14.85
Southern gray forge.....	14.35 to 14.85
Southern mottled.....	14.35 to 14.85
Malleable Bessemer.....	16.00 to 16.50
Standard Bessemer.....	19.40 to 19.90
Basic.....	16.00 to 16.50
Jackson Co. and Kentucky silvery, 6 per cent.....	20.40
Jackson Co. and Kentucky silvery, 8 per cent.....	21.40
Jackson Co. and Kentucky silvery, 10 per cent.....	22.40

(By Mail)

Rails and Track Supplies.—New rail tonnage now in the market is insignificant and little buying of rails or track supplies is anticipated until after July 1. We quote standard railroad spikes at 1.90c. to 2c., base; track bolts with square nuts, 2.30c. to 2.40c., base, all in carload lots, Chicago; tie plates, \$33 to \$35 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open-hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—Prospective tonnage in struc-

tural steel offers the most promising outlook for new buying the present situation affords. Bridges at Memphis and Louisville and terminal steel construction at Kansas City will require over 50,000 tons of steel. At Chicago the George A. Fuller Company has the general contract for the new Michigan avenue building for which Jarvis Hunt is preparing plans, while the East Chicago plant of the Baldwin Locomotive Works, which will have to be of heavy construction, will take in excess of 7500 tons. The greater portion of the buying now being done by the railroads is of structural shapes for bridge work, the largest order recently placed being for 2500 tons for the North Coast Railroad Company at Spokane, the steel to be furnished by the American Bridge Company. Miscellaneous orders for structural material in small lots up to 100 tons are numerous and buyers are finding themselves able to secure delivery in from two to four weeks. Contracts for fabricated steel reported in the past week include 935 tons for the Denver & Rio Grande Railroad, awarded to the American Bridge Company. For Chicago delivery mill shipment we quote 1.63c.

Plates.—Railroad buying of cars and locomotives, while scattering, is in the aggregate of considerable importance. Plate prices appear to be firmly maintained but the difficulties which formerly existed in securing shipments have generally disappeared and the mills able to quote the most attractive delivery are aggressively seeking orders. For Chicago delivery, mill shipment, we quote 1.63c.

From store we quote for Chicago delivery 2.05c.

Sheets.—Competitive shading of prices for both black and galvanized sheets is being participated in by practically all makers. Probably because of the still continuing decline in spelter, prices of galvanized sheets are being quoted freely at \$3 below the nominally full prices. We quote for Chicago delivery in carloads from mill: No. 28 black sheets, 2.48c. to 2.53c.; No. 28 galvanized, 3.53c. to 3.58c.; No. 10 blue annealed, 1.93c.

We quote store prices without change as follows: No. 10 blue annealed, 2.25c.; No. 28 black, 2.90c.; No. 28 galvanized, 4.15c.

Bars.—Rumors of lower prices for iron bars in this market are frequent and widespread, though orders for several hundred tons placed during the past week brought 1.55c. at Chicago mill. New business is light. New steel bar tonnage is likewise scattering, with some of the important agricultural implement contracts still to be placed. Demand for reinforcing bars continues good. Specifications also are following contract schedules promptly. We quote for mill shipment as follows: Bar iron, 1.50c. to 1.57½c.; soft steel bars, 1.58c.; hard steel bars, 1.60c.; shafting in carloads, 58 per cent. off; less than carloads, 53 per cent. off.

For delivery from store, we quote soft steel bars, 1.95c.; bar iron, 1.95c.; reinforcing bars, 1.95c. base with 5c. extra for twisting in sizes ¾ in. and over, and usual card extras for smaller sizes. Shafting 53 per cent. off.

Rivets and Bolts.—Reports of improvement in the demand for rivets do not appear to be well founded. Rivet manufacturing capacity is so extensive as to absorb readily all current offerings. Contracting for bolts and nuts is more tardy than usual and parallels the prevailing buying policy in other lines. We quote from mill as follows: Carriage bolts up to ¾ x 6 in., rolled thread, 75-10; cut thread, 75-5; larger sizes, 70-2½; machine bolts up to ¾ x 4 in., rolled thread, 70-10-5; cut thread, 75-10; large size, 70-7½; coach screws, 80-10; hot pressed nuts, square head, \$5.70 off per cwt.; hexagon, \$6.30 off per cwt. Structural rivets, ¾ to 1¼ in., 2.38c., base, Chicago, in carload lots; boiler rivets, 0.10c. additional.

Out of store we quote for structural rivets, 2.70c., and for boiler rivets, 2.90c. Machine bolts up to ¾ x 4 in., 70-7½; larger sizes, 65-5; carriage bolts up to ¾ x 6 in., 70-5; larger sizes, 65 off. Hot pressed nuts, square head, \$5.30, and hexagon, \$5.90 off per cwt.

Wire Products.—Specifications for fencing thus far in June exceed the totals of corresponding weeks in May and jobbers report that the movement of material from their stocks to the retail trade is quite up to normal. Wire mill activity is tapering off toward the midsummer lull, but this is usual and follows very heavy shipments in the early spring. Wire nail trade is moderately active. We quote as follows to jobbers: Plain wire, No. 9 and coarser, base, \$1.78; wire nails, \$1.98; painted barb wire, \$1.98; galvanized, \$2.38; polished staples, \$1.98; galvanized, \$2.33, all Chicago.

Cast Iron Pipe.—The most important award in the past week was the placing of 5000 tons by the city of Los Angeles with the United States Cast Iron Pipe & Foundry Company. This company is also the low bidder for 2100 tons of pipe at Akron, Ohio. The pipe for Los Angeles was well distributed as to sizes, the largest

pipe being 30-in. On some sizes prices are slightly firmer. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$28.50; 6 to 12 in., \$26.50; 16 in. and up, \$25.50, with \$1 extra for gas pipe.

Old Material.—Prices for scrap in the Chicago market are demoralized, and the customary differentials between various grades of material are far from regular. The most marked declines appear in connection with those items for which there is a narrow market, such as old iron rails, iron angle bars and similar grades. For these there has been little or no consumers' demand but dealers have been able to buy at prices which have no bearing upon the rest of the market. For the standard grades of scrap the decline has been from 25c. to 50c. per ton since our last report. During the week the Illinois Steel Company bought 2000 tons of heavy melting steel for the Gary works, and the Pullman Company is understood to have been a buyer of railroad wrought. One of the local bar mills has been buying steadily in small lots at attractive figures, but the total buying by consumers has been very limited. Railroad scrap lists include 1200 tons from the Wabash, 800 tons from the Chicago & Alton, 800 tons from the St. Louis & San Francisco, 150 tons from the Toledo, St. Louis & Western, 1500 tons from the Chicago, Milwaukee & St. Paul, 1200 tons from the Soo line and a large list from the Atchison, Topeka & Santa Fé, which does not represent its entire holdings. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.

Old iron rails	\$15.25 to \$15.50
Old steel rails, rerolling	12.50 to 12.75
Old steel rails, less than 3 ft.	11.25 to 11.75
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	13.50 to 14.00
Heavy melting steel scrap	10.00 to 10.50
Frogs, switches and guards, cut apart.	10.00 to 10.50
Shoveling steel	10.00 to 10.25
Steel axle turnings	8.00 to 8.50

Per Net Ton.

Iron angles and splice bars	\$14.00 to \$14.50
Iron arch bars and transoms	14.00 to 14.50
Steel angle bars	10.00 to 10.25
Iron car axles	19.25 to 19.75
Steel car axles	16.75 to 17.25
No. 1 railroad wrought	10.25 to 10.75
No. 2 railroad wrought	10.00 to 10.50
Cut forge	10.00 to 10.50
Steel knuckles and couplers.	10.75 to 11.25
Steel springs	11.00 to 11.50
Locomotive tires, smooth	12.00 to 12.50
Machine shop turnings	5.00 to 5.50
Cast and mixed borings	4.75 to 5.25
No. 1 busheling	8.75 to 9.25
No. 2 busheling	6.50 to 7.00
No. 1 boilers, cut to sheets and rings.	7.25 to 7.75
Boiler punchings	12.00 to 12.50
No. 1 cast scrap	10.75 to 11.25
Stove plate and light cast scrap.	9.00 to 9.50
Railroad malleable	11.00 to 11.50
Agricultural malleable	9.75 to 10.25
Pipes and flues	7.50 to 8.00

Philadelphia

PHILADELPHIA, PA., June 10, 1913.

Statistics of the Eastern and Virginia pig iron associations show, contrary to general expectation, that the stocks of pig iron on hand June 1 were lower than on January 1, and that the total stocks at these furnaces June 1 were but 60.50 per cent. of the stocks on hand June 1, 1912. Unfilled orders are smaller, due to the policy of buyers in refraining from buying for forward delivery. It appears to be the policy of the principal producers of pig iron for the Eastern market to confine production within market requirements. Notwithstanding the strong statistical position, as well as the recently increased inquiry for foundry grades, actual buying proceeds slowly. Concessions have again been made by some producers. The situation in finished materials shows little change, new business continuing light. Encouraging inquiries for boat plates continue to come out. Ship builders are figuring on a fleet of six vessels for the Panama Canal trade from the Hamburg-American Line, two of which will probably be built at Delaware River yards. Specifications for plates and shapes continue good. The old material market is dull, with prices almost entirely nominal. Coke continues firm.

Iron Ore.—Little business is moving although some negotiation for second half ore is pending. Importations during the week include 12,300 tons of Cuban, 4450 tons of Canadian and 1420 tons of Newfoundland ore.

Pig Iron.—Orders have been light, as is usual on a falling market. The bulk of the recent heavy inquiries are still under negotiation. Southern iron is beginning to be more of a factor in this market. The Baldwin Locomotive Works, which recently inquired for 1000 to 2000 tons of cylinder grade foundry, purchased 2000 tons of Southern iron. Several moderate lots of Southern No. 2 have been sold to general gray iron foundries at \$11, Birmingham, which on rail and water freight, would be equal to \$15.20 delivered at boat, here, and by all-rail rate, delivered in this vicinity, \$15.85 to \$16. Southern iron has been figuring extensively in negotiations under consideration by cast-iron pipe makers and sales of several 1000-ton lots of the lower grades have been made, usually at the \$11, Birmingham, basis for No. 2. Offers made for moderate quantities at 25c. under this basis have been refused by some producers. A sale of 2000 tons of Northern low grade iron was made to a Delaware River melter for early shipment, at \$15 at nearby furnace. Eastern Pennsylvania foundry grades have not been active; buyers purchase only small lots for early delivery and on this character of business lower prices have developed. Standard brands of eastern Pennsylvania No. 2 X can now be had at \$16.25 delivered, although up to \$16.75 is paid on non-competitive business. One round lot of No. 2 plain has been sold in this district, for extended delivery. The Pennsylvania Railroad has not yet placed orders against its recent inquiry for a maximum of 9000 tons of foundry grades, nor have recent large inquiries for coke malleable pig developed into business. The Government has specifications out for about 1000 tons of foundry iron for the various navy yards, while an inquiry for 1250 tons, July and August delivery, is being made by the Southern Railway. Moderate sales of Virginia foundry are being made for prompt, third quarter and last half delivery, at \$14, Virginia furnace, for No. 2 X. There has been little demand for rolling mill forge iron. Small sales have been made, however, at prices ranging close to \$15.25 delivered. Steel making irons have been comparatively quiet. Makers of basic iron have expressed a willingness to do \$16 delivered for this grade, but there is no demand, and even this quotation is nominal. Small sales of standard low phosphorus iron have been made at \$23.50, delivered here. Prices generally lack strength, although ruling figures closely approach cost. The following range about represents the market for standard brands, delivered in buyers' yards in this district:

Eastern Pennsylvania No. 2 X foundry.	\$16.25 to \$16.75
Eastern Pennsylvania No. 2 plain.	16.00 to 16.25
Virginia No. 2 X foundry	16.80 to 17.00
Virginia No. 2 plain	16.55 to 16.75
Gray forge	15.25 to 15.50
Basic (nominal)	16.00
Standard low phosphorus	23.50

Ferroalloys.—An occasional car of prompt 80 per cent. ferromanganese moves at \$60, seaboard, although the majority of sellers ask \$61 for either prompt or forward. There has been no demand for forward ferromanganese. Importations during the week were confined to 225 tons. No movement is reported in ferrosilicon.

Billets.—Recent inquiries from Western consumers are still under negotiation. Further third quarter inquiries from Eastern consumers have come out and one sale of 1000 tons of basic open hearth rolling billets has been made at \$28, delivered, which price Eastern makers are holding for deliveries in this district. Billet makers are fully engaged and are unable to meet the demands of customers for early shipments. Forging billets are firm at \$34 minimum, Eastern mill.

Plates.—A good daily demand is reported. Orders are widely distributed and cover all classes of plates. The volume of new business is somewhat smaller but specifications keep mills fully engaged. A good volume of business in ship plates is in sight, further inquiries having recently developed. The demand for bridge and boiler plates continues active. Few contracts for extended delivery have been placed. Consumers endeavor to get price concessions but are generally reported unsuccessful. Eastern mills are holding at 1.75c. delivered here, although Western plates for somewhat more distant delivery are available at 1.60c. to 1.65c. here.

Structural Material.—While the demand has not been heavy, the outlook is a trifle better. Large inquiries for boat shapes have come out, the demand for small bridges is better, and several fair fabricated projects are ahead. The Ritz-Carlton addition will require from 1500 to 2000 tons. Some 1500 tons will be required by

the Philadelphia & Reading Railway for track elevation work, and numerous small building projects are being figured on. Miscellaneous plain shape orders have been in fair volume. Quotations are unchanged, ranging from 1.75c. for small sizes to 1.60c. to 1.65c. for the general run of larger sizes, delivered in this district.

Sheets.—Eastern mills are unable to meet the demands of customers for early shipments. Specifications have been heavy and, together with the general run of week-to-week orders for early shipment, exceed mill capacity. The general range of prices is unchanged. Western No. 10 blue annealed sheets are quoted at 1.90c. delivered here, while Eastern mills, making smooth loose-rolled sheets, obtain 1.95c. here for prompt shipment.

Bars.—The market is easy. Buying has been mainly in small lots and mills are more eager for orders. While some Eastern makers of bar iron still hold at 1.50c. mill, or 1.57½c. delivered here, there is no doubt that, on sharp competition, as low as 1.45c. mill, or 1.52½c. here, could be done. Steel bars have not been active and are quoted at 1.55c. to 1.60c., delivered in this district.

Coke.—Makers appear to be in control of the situation and are firmly maintaining prices. In furnace grades, contract coke is held at \$2.25 to \$2.50 at oven, but little business has been done. Small sales of spot furnace coke have been made at \$2 to \$2.15 at oven, according to quality. Moderate sales of foundry coke are reported at \$3 to \$3.25. The following range of prices, per net ton, is named for deliveries in buyers' yards in this vicinity.

Connellsville furnace coke	\$4.05 to \$4.50
Connellsville foundry coke	4.90 to 5.35
Mountain furnace coke	3.75 to 4.10
Mountain foundry coke	4.50 to 5.00

Old Material.—The market could scarcely be quieter. Consumers show little interest, and in some cases will not even consider bargain lots. One steel maker, who bought some 7000 tons of No. 1 heavy melting steel, at \$12 delivered, has withdrawn from the market. Lower prices have developed in other grades and some cannot be moved except at concessions. Quotations are entirely nominal, and in the majority of grades not enough business is moving to establish prices. An approximate range for delivery in buyers' yards in this district, covering eastern Pennsylvania, taking freight rates varying from 35c. to \$1.35 per gross ton, is as follows:

No. 1 heavy melting steel	\$12.00
Old steel rails, rerolling (nominal)	\$15.00 to 15.50
Low phosphorus heavy melting steel scrap (nominal)	17.00
Old steel axles (nominal)	17.50 to 18.00
Old iron axles (nominal)	25.50 to 26.50
Old iron rails	17.50 to 18.00
Old carwheels	13.00 to 13.50
No. 1 railroad wrought	15.00
Wrought-iron pipe	11.50 to 12.00
No. 1 forge fire	10.50 to 11.00
No. 2 light iron (nominal)	6.50 to 6.75
No. 2 cut busheling	8.00 to 8.50
Wrought turnings	8.00 to 8.50
Cast borings	8.25 to 8.50
Machinery cast	13.25 to 13.50
Grate bars, railroad	10.00
Stove plate	10.00
Railroad malleable (nominal)	12.00

Cleveland

CLEVELAND, OHIO, June 10, 1913.

Iron Ore.—The heavy movement during May despite unfavorable weather conditions leads to the belief that the June shipments will exceed 8,000,000 tons and break all previous records for any one month. Of the 7,284,212 tons shipped in May Lake Erie ports received 5,325,695 tons. Some sales in very small lots are still being made. A few furnacemen have announced that they will need additional ore, but they are in no hurry to buy. We quote prices as follows: Old range Bessemer, \$4.40; Mesaba Bessemer, \$4.15; old range non-Bessemer, \$3.60; Mesaba non-Bessemer, \$3.40.

Pig Iron.—Though some improvement is noted in the volume of inquiry few orders have been placed. The only sale of any size for delivery in this territory was that for the Cleveland plant of the Westinghouse Electric & Mfg. Company, which has been pending for several weeks. This iron is understood to have been bought at about \$14.90, delivered, for No. 2. A large share of it will come from a Cleveland furnace. A northern Ohio consumer who recently decided to defer buying after having an inquiry out for 600 to 900 tons of foundry iron for the last half has again come into

the market for 1200 to 1800 tons. Another northern Ohio inquiry is for about 800 tons of foundry iron. Prices are weak. Foundry iron is quoted at \$14. Valley furnace, for No. 2. This quotation, however, is not general. The minimum quotations are being met by a Cleveland furnace. The weakness in the Southern iron market continues. No. 2 Southern is now generally quoted at \$11, Birmingham, and there are reports, though unconfirmed, that this price has been shaded. Basic is quoted at \$14.50. For prompt shipment and during the remainder of the year we quote Cleveland delivery as follows:

Bessemer	\$17.50
Basic	\$15.40 to 15.65
Northern No. 2 foundry	14.90 to 15.25
Southern No. 2 foundry	15.35
Gray forge	14.75
Jackson County silvery, 8 per cent. silicon	20.35

Coke.—While the market is quiet prices are firm. Standard grades of Connellsville foundry coke are held at \$3 to \$3.25, per net ton at oven, for spot shipment and contract. Furnace coke for prompt shipment is quoted at \$2.15 to \$2.25, and for the last half at \$2.25 to \$2.50. Wise county, Virginia, foundry coke has been advanced 25c. a ton, to \$3.

Finished Iron and Steel.—The demand is more active than a few weeks ago. Specifications are coming out in fair volume and there is rather more new inquiry. In addition to the improved demand a feature of the market is the almost entire disappearance of premium business. Some mills that make a practice of taking orders at premium prices for quick delivery are now looking for business at regular prices. Steel bars are being offered for early delivery at 1.40c., Pittsburgh, and plates and shapes at 1.45c. to 1.50c. Eastern mills, however, are still able to get a little premium over these prices for plates and structural material. Despite the weakness in the Western bar-iron market Cleveland and Youngstown mills are generally naming 1.60c. as their minimum quotation. Additional orders are coming from the railroads for bridges to replace those destroyed in the spring floods, and Ohio bridge shops are well filled with this class of work. In building lines the outlook shows an improvement. The American Bridge Company has taken 2500 tons for the new steel plant of the Otis Steel Company, Cleveland. Bids were to be received to-day for the steel for the May Company building in Cleveland, but some contractors have been unable to get their bids in and have asked for a slight extension. Instead of 6000 to 8000 tons of steel, as previously announced, it is stated that this building will require between 8000 and 9000 tons. The National Iron & Wire Company, Cleveland, has taken 400 tons for a new building for the National Screw & Tack Company, Cleveland. Other new building work in this city that will be placed shortly includes the Cleveland Art Museum, 1400 tons; an addition to the William Taylor & Sons Company store, 600 to 700 tons, and a new building for the W. S. Tyler Company, 750 tons. The Cambria Steel Company has taken 300 tons of rails from the Cleveland Construction Company for a traction line in Michigan City, Ind., and another rail inquiry for 700 tons is pending. Warehouse prices are unchanged at 2.10c. for steel bars and 2.25c. for plates and structural material.

Old Material.—The market is dull and very weak, the large railroad offerings last week apparently having a depressing effect on prices. Quotations on several grades have declined 50c. or more a ton. A local mill has reduced its offering price to \$11.25 for heavy steel scrap. We note the sale of about 1000 tons of this grade to a Sharon consumer at \$12.75 delivered. One Cleveland consumer has placed an embargo on all scrap. Sales of railroad malleable are reported at \$12.25. We quote f.o.b. Cleveland as follows:

Per Gross Ton.

Old steel rails, rerolling	\$14.00 to \$14.50
Old iron rails	15.00 to 15.50
Steel car axles	18.00 to 18.50
Heavy melting steel	11.00 to 11.50
Old carwheels	13.25 to 13.75
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	10.75 to 11.25
Railroad malleable	12.25
Light bundled sheet scrap	9.00 to 9.50

Per Net Ton.

Iron car axles	\$20.50 to \$21.00
Cast borings	6.25 to 6.50
Iron and steel turnings and drillings	4.75
Steel axle turnings	8.00 to 8.50
No. 1 busheling	10.00 to 10.25
No. 1 railroad wrought	11.50 to 12.00
No. 1 cast	11.25 to 11.75
Stove plate	8.00 to 8.50
Bundled tin scrap	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO, June 11, 1913.—(By Telegraph.)

Pig Iron.—The market has a slightly better tone. Considerable quiet buying marked the wind up of last week, but orders continue to be confined to small lots, for filling in, with the exception of two or three purchases of Southern iron, each totaling over 500 tons for last half shipment. It has been rumored that better than \$11, Birmingham basis, has been done on No. 2 foundry but this report appears to be without foundation. However, it is possible that a few special lots of low grade iron may have been sold below the market level. Northern No. 2 foundry is reported to have been quoted at \$14.75, Ironton, but this has been denied by furnace interests, who cite the futility of making such a small cut to meet the very low prices prevailing in other districts. A central Ohio melter is asking for 900 to 1500 tons of foundry iron for last half delivery. Two inquiries from central Indiana call for a total of 2000 tons and it is probable that Southern iron will be purchased. Several smaller inquiries that have been out a couple of weeks or longer are still unclosed. Competition between sellers is very keen, but buyers seem disposed to await expected bargain quotations before placing any large orders. Both basic and malleable are dull, although there is likely to be considerable activity in the first named before the month is past. Based on freight rates of \$3.25 from Birmingham and \$1.20 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry and 1 soft..	\$14.75 to \$15.25
Southern coke, No. 2 foundry and 2 soft..	14.25 to 14.75
Southern coke, No. 3 foundry.....	13.75 to 14.25
Southern, No. 4 foundry	13.25 to 13.75
Southern gray forge	12.75 to 13.25
Ohio silvery, 8 per cent. silicon.....	20.20 to 20.70
Southern Ohio coke, No. 1.....	17.20 to 17.70
Southern Ohio coke, No. 2.....	16.20 to 16.70
Southern Ohio coke, No. 3.....	15.95 to 16.45
Southern Ohio Malleable Bessemer	16.20
Basic, Northern	16.20 to 16.45
Lake Superior charcoal	18.75 to 19.25
Standard Southern carwheel	27.25 to 27.75

(By Mail)

Coke.—More business is under negotiation for foundry coke than for some time. Furnace grades are moving slowly, as the furnace and oven operators are still at variance over contract prices. A large tonnage of furnace coke for last half shipment is yet to be contracted for. Quotations in all three coke producing districts are about on the same level. Furnace coke is around \$2.25 per net ton at oven, for prompt shipment, with a nominal advance of 25c. asked on contract business. Foundry coke is firm; while \$2.75 may be done for nearby shipment, the average contract figure is \$3 per net ton at oven, and in a number of instances producers are holding out for \$3.25 for last half delivery.

Finished Material.—A continued slight improvement is observed in sheets. The local mill now reports orders booked over seven weeks ahead, with both domestic and foreign business in fairly good shape. Reinforcing concrete bars are in excellent demand, although this particular trade appears to come in spurts. Railroad track material, as well as structural shapes, shows some improvement. The local warehouse quotation on steel bars is from 2.10c. to 2.15c., and on structural material from 2.15c. to 2.20c. Blue annealed No. 10 sheets, from stock, are quoted at 2.40c.

Old Material.—The market is in a demoralized condition, and no stable quotations are obtainable. Buying is very slack, and as the rolling mills are fairly well stocked, no change is expected in the near future. The weakness in Southern pig iron also has a tendency to keep prices down to a low level in this territory. The minimum figures given below represent what buyers are willing to pay for delivery in their yards in southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton.	
Bundled sheet scrap	\$7.50 to \$8.00
Old iron rails	12.75 to 13.25
Relaying rails, 50 lb. and up.....	19.75 to 20.25
Rerolling steel rails	11.75 to 12.25
Melting-steel rails	9.75 to 10.25
Old carwheels	11.50 to 12.00

Per Net Ton.	
No. 1 railroad wrought	\$9.75 to \$10.25
Cast borings	5.00 to 5.50
Steel turnings	5.00 to 5.50
No. 1 cast scrap	9.50 to 10.00
Burnt scrap	6.75 to 7.25
Old iron axles	17.00 to 17.50
Locomotive tires (smooth inside).....	10.75 to 11.25
Pipes and flues	6.25 to 6.75
Malleable and steel scrap	8.00 to 8.50
Railroad tank and sheet scrap	5.00 to 5.50

Birmingham

BIRMINGHAM, ALA., June 9, 1913.

Pig Iron.—With pig iron readily obtainable in small as well as large lots for Southern delivery at \$11.50, and admissions by furnace operators that a large tonnage might be obtained in competitive territory at \$11.25, the basis of actual business done by Alabama furnaces at this time appears to be from \$11.25 to \$11.50. If anyone has sold \$11 iron, it has not been in Southern territory. The greater portion of recent business was on the \$11.50 basis. A sale of 1000 tons of Nos. 3 and 4, 500 tons each, was made by a furnace interest on the \$11.50 basis. Brokers say the carload and other small lots they have purchased were taken at the same figure. Some furnaces will not sell under \$11.50. No apparent special effort is being made to promote trading. In some quarters it is believed that bottom has been struck. Southern consumption is still heavy. Stocks on Alabama yards are admitted to be around 150,000 tons, with one interest having an especially large stock. In spite of the downward trend of the market, May was nearly as great a producer of pig iron as April. Two stacks went out the latter portion of the month and a further banking of furnaces is reported as imminent. Inquiries are reported as more brisk. Quotations per gross ton, f.o.b. Birmingham, are as follows:

No. 1 foundry and soft.....	\$11.50 to \$12.00
No. 2 foundry and soft.....	11.25 to 11.50
No. 3 foundry	10.75 to 11.25
No. 4 foundry	10.50 to 10.75
Gray forge	10.25 to 10.50
Basic.....	11.25 to 11.50
Charcoal.....	24.50 to 25.00

Cast Iron Pipe.—It has been difficult for some time to keep all pits going in the larger pipe factories owing to the slow outward movement and the slower influx of orders. The municipal bond market is held largely responsible for the condition. An order for several thousand tons for Los Angeles was booked by the leading interest. We quote \$22 for 4 in. and \$20 for 6 in. and upward, per net ton.

Coal and Coke.—Coke is, if anything, in still stronger demand. None is to be had under \$3, and \$3.25 is the usual minimum. Coke movements to Mexico have been hampered, but the manufacture for that trade is continued until railroad conditions are bettered. We quote, per net ton, f.o.b. oven, as follows: Furnace, \$3 to \$3.50; foundry, \$3.50 to \$4.25. Coal mines are unusually busy for this time of the year. The steam coal trade is expanding and domestic yards are laying in a heavy supply. The half-year output of Alabama mines is estimated at 9,000,000 tons. Prices are somewhat higher than last year.

Old Material.—There is no real market, the demand being spotted and sales made according to customer and other conditions. Quotations, per gross ton, f.o.b. dealers' yards, are as follows:

Old iron axles (light)	\$15.00 to \$15.50
Old steel axles (light).....	15.00 to 15.50
Old iron rails	13.50 to 14.00
No. 1 R. R. wrought.....	12.00 to 12.50
No. 2 R. R. wrought.....	10.00 to 10.50
No. 1 country wrought.....	9.50 to 10.00
No. 2 country wrought.....	8.50 to 9.00
No. 1 machinery cast.....	9.50 to 10.00
No. 1 steel scrap.....	10.50 to 11.00
Tram car wheels.....	10.50 to 11.00
Standard car wheels.....	12.00 to 12.50
Light cast and stove plate.....	8.25 to 8.75

St. Louis

ST. LOUIS, MO., June 9, 1913.

Continued buying in this market, while evidencing conservatism and hand-to-mouth conditions, is such as to show that consumption is well up with contract allotments and that purchasers are not only in need of material but that they are facing this condition without heavy stocks in their yards.

Pig Iron.—Sales have not been large in any individual instance, but there has been a considerable aggregate of well spread small orders, showing that consumers are in need of supplies but are conservatively purchasing because of existing uncertainties. Investigation of the status of contracts shows that very few of the large purchasers of this territory are committed beyond the first half; further that they are all insistent on deliveries as allotted, and beyond that that they are disinclined to make large contracts in spite of the fact that they are melting on a level with their receipts. There have been a number of good inquiries out, including one for 1200 tons and one for 500 tons of No. 2 South-

ern, one for 100 tons of No. 1 soft, one for 1200 tons of Northern basic and several smaller inquiries.

Coke—Few sales have been made, mostly carload lots, though one transaction was closed for 200 tons of 72-hr. Connellsville at the full price. By-product coke is on a parity with Connellsville.

Finished Iron and Steel—No transactions are reported in standard section steel rails, though one proposition involving about 2500 tons is expected to materialize into a definite order shortly. Light rails are in slightly better demand from the coal interests, but the lumber people are not in the market. Track fastenings are in fair request. Orders for structural material continue to come in from the fabricating shops, which report themselves in good condition, no oversupply appearing anywhere in their yards. All are taking their allotted material and putting it quickly into work. Bars continue in insistent demand and the wagon and agricultural interests are especially busy, particularly the former. Reinforcing bars are in good request with a number of contracts in sight, including some viaduct work in grade crossing abolition in St. Louis. In structural material in prospect is a large hotel project for St. Louis, reported financed but awaiting city ordinances permitting certain concessions. Prospective Frisco power needs, rail requirements and rolling stock have been held up by the recent receivership.

Old Material—Aside from a small demand from a few steel mills there is still further discouragement reported by the dealers who, except for a little trading among themselves, are doing practically nothing. Relaying rails are in sharp demand, but the dealers are unable to get any to meet requests. The railroads continue to push out considerable quantities of old material, and this in conjunction with the lack of demand makes for a weak condition of affairs. The lists out include 1000 tons from the Frisco, 5000 tons from the Southern, 400 tons from the Vandalia and several smaller ones from minor roads. We quote dealers' prices, f.o.b. St. Louis, as follows:

	Per Gross Ton.
Old iron rails	\$11.75 to \$12.25
Old steel rails, rerolling	11.75 to 12.25
Old steel rails, less than 3 ft.	10.50 to 11.00
Relaying rails, standard section, subject to inspection	22.50 to 23.50
Old car wheels	12.50 to 13.00
Heavy melting steel scrap	10.50 to 11.00
Frogs, switches and guards cut apart	10.50 to 11.00
	Per Net Ton.
Iron fish plates	\$10.50 to \$11.00
Iron car axles	18.00 to 18.50
Steel car axles	15.50 to 16.00
Wrought arch bars and transoms	13.00 to 13.50
No. 1 railroad wrought	9.75 to 10.25
No. 2 railroad wrought	9.25 to 9.75
Railroad springs	8.00 to 8.50
Steel couplers and knuckles	9.00 to 9.50
Locomotive tires, smooth	10.00 to 10.50
No. 1 dealers' forge	6.50 to 7.00
Mixed borings	4.75 to 5.25
No. 1 busheling	9.00 to 9.50
No. 1 boilers, cut to sheets and rings	6.00 to 6.50
No. 1 cast scrap	10.00 to 10.50
Stove plate and light cast scrap	7.00 to 7.50
Railroad malleable	9.00 to 9.50
Agricultural malleable	7.00 to 7.50
Pipes and flues	7.00 to 7.50
Railroad sheet and tank scrap	6.00 to 6.50
Railroad grate bars	7.00 to 7.50
Machine shop turnings	5.75 to 6.25
Bundled sheet scrap	4.75 to 5.25

Buffalo

BUFFALO, N. Y., June 10, 1913.

Pig Iron—A little better tone is apparent in the market as regards inquiry, with more active interest on the part of buyers and a small increase in tonnage sold, as compared with last week. Price schedules, however, have shown some demoralization, with a range all the way from \$14 to \$15.50 for foundry and malleable according to grade, buyers' special requirements, furnace conditions, etc. Most producers are of the opinion that the bottom was reached this week and that the price situation will exhibit a firming up in the near future. Sales of considerable amounts of malleable were made, some at lower prices than reported last week. The range of quotations is apparently wide and it is understood that malleable has sold as low as \$14.50 in one or two special cases; on the other hand, sales were reported above \$15.50. We quote as follows f.o.b. Buffalo, for current quarter and last half:

No. 1 foundry	\$14.75 to \$15.25
No. 2 X foundry	14.50 to 14.75
No. 2 plain	14.25 to 14.50
No. 3 foundry	14.00 to 14.25
Gray forge	13.75 to 14.00
Malleable	14.75 to 15.25
Basic	15.75 to 16.25
Charcoal	16.00 to 17.00

Finished Iron and Steel—General conditions as regards inquiry, sales and shipment in finished product lines are practically the same as were reported a week ago. Prices quoted in this territory by all the leading mills show no variation from prices quoted during the past several months. While some of the smaller Eastern mills are reported as being more aggressive in securing new business and to have made concession prices in the last week, they have in reality simply taken off the premiums heretofore asked and instead of making a recession in prices are quoting bars, plates and shapes at 1.50c. f.o.b. their mills, which is really slightly higher than the base price. Prices in black and galvanized sheets, which were reported as softer last week, have again firmed up although only moderate demand is noted. Prices of wire products are being steadily maintained by the principal interest, although selling agencies of some of the smaller interests are reported to have shaded prices slightly. In fabricated structural material a large amount of business is being figured on, and in some instances slightly lower prices have been made. Bids will soon be taken for Niagara Falls Gazette building at Niagara Falls, N. Y., requiring about 100 tons of steel; also for a store and office building for the Thayer Syndicate, Buffalo, taking 100 tons. The Jones & Laughlin Steel Company has been awarded contract for steel for the Hornell Cold Storage Company's building at Hornell, 125 tons, and the Lane Bridge Company, Painted Post, N. Y., has received contract for steel for a wholesale dry goods building for the Fish Estate at Elmira, 180 tons. The Standard Structural Steel Company, Buffalo, was low bidder for the 160 tons required for the clubhouse to be erected by the Order of the Orioles at Buffalo.

Old Material—The market remains inactive and no change for the better is noted, with prices tending toward increased softness. Demand is absent except for specialties. Some buyers are picking up bargains where obtainable in the better grades of heavy steel and low phosphorus. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	\$11.50 to \$12.00
Boiler plate, sheared	13.00 to 13.75
No. 1 busheling scrap	10.50 to 11.00
No. 2 busheling scrap	8.00 to 8.50
Low phosphorus steel	16.50 to 17.00
Old iron rails	15.00 to 15.50
No. 1 railroad wrought	13.50 to 14.00
No. 1 railroad and machinery cast scrap	13.50 to 14.00
Old steel axles	17.50 to 18.00
Old iron axles	24.00 to 24.50
Old carwheels	13.75 to 14.50
Railroad malleable	12.50 to 12.75
Locomotive grate bars	10.00 to 10.50
Stove plate (net ton)	9.75 to 10.00
Wrought pipe	9.50 to 10.00
Wrought iron and soft steel turnings	6.00 to 6.50
Clean cast borings	7.50 to 8.00
Bundled tin scrap	16.00

German Steel Prices, Rapidly Falling

Numerous Price Reductions Reported—
Orders Falling Off in Nearly All Lines

BERLIN, May 30, 1913.

The reaction in the iron trade has assumed a more pronounced form. Price reductions have become more general and of more serious import. Bars continue to be the most sensitive. Offers of steel bars at 107 to 108 marks in the Rhenish-Westphalian district have become common, while in the Southwest (Luxemburg-Lorraine) sales as low as 100 to 101 marks are reported. Even at these sharply reduced prices, it is added, consumers are taking only small quantities for immediate necessities. The plate trade is also feeling the pressure more severely. Heavy plates are this week quoted at 125 to 128 marks, against a previous price of 128 to 130 marks. Boiler plates are offered at 135 marks, against 138 to 140 marks; and thin plates can be had as low as 125 marks, this section of the trade being without an organization to resist the fall. Plate consumers are buying on a restricted basis; especially is the export business in a most unsatisfactory position. Bands have begun to follow the general downward drift; offers are now being made at 140 marks, while the convention's price was until recently 145 marks, and business in this specialty is very quiet. The Rivet Association has reduced boiler and bridge rivets 5 marks a ton.

The Steel Works Union yesterday opened business in semi-finished material at unchanged prices, but with the announcement that the drawback on exports of

finished products will be increased, in order to promote the export trade of the simple rolling mills. It is understood that the increase will amount to 5 marks a ton, and it is expected to take effect on export orders filled the rest of this quarter.

The falling tendency in Germany this week has been aggravated by the news from Belgium. That market has again sent in news of an unusual number of reductions. On Monday it was announced that the Comptoir des Acieries Belges had decided to make a cut of 15 francs in the home price of semi-finished steel, to take effect after the end of June, on quantities of 250 tons or less, and 17.50 francs on larger orders up to 1000 tons. During June a 10 franc rebate will be allowed. To these cuts in the home price the Comptoir two days later made a reduction of 5s. on the export price of steel, and at the same time pig iron for the home trade was cut 1 to 2 francs. This morning a Brussels' dispatch reports a further drop of 2.50 francs in bars and plates. The mail reports from the Belgian trade are of a most pessimistic character.

The Steel Syndicate's Monthly Meeting

The Steel Works Union held its usual monthly meeting yesterday. Its survey of the situation says that the trade in semi-finished steel has not been able to maintain entirely the hitherto existing tension, owing to uncertainty regarding further developments in the international markets. Consumers are holding back owing to reductions of prices abroad, and calls for delivery are less urgent than hitherto. Business in heavy rails continues favorable, the orders in hand at the beginning of May exceeding a year ago by nearly 400,000 tons. The Prussian railroads have placed orders for a part of the rails and ties called for by the 1914 budget, the amounts being greater than for the current year. The foreign market for rails remains satisfactory, and prospects for the immediate future are also pronounced favorable. In structural shapes the new orders coming in are almost without exception for immediate requirements only; for remoter delivery buyers continue reserved. Sales for the summer quarter at unchanged prices were declared open. The Union voted not to participate in the San Francisco Exposition.

At a recent meeting of the Pig Iron Syndicate it was reported that orders booked amount to 2,600,000 tons, or 90 per cent. of the allotments. These orders insure full employment for the furnaces to the end of November. It is expected that within a short time sales will absorb the December output. Calls for delivery, notwithstanding the weakness in finished products, are heavy.

As the price of bars is now approaching the point where profits must disappear for mills buying their material in the market, the question of organizing the bar trade is again occupying attention. It is reported that some of the manufacturers have determined to make an energetic attempt to get the mills to come together in a strong syndicate like the Steel Works Union. Efforts to establish such an organization have been tried for 13 years without success; hence many of the manufacturers have no hope that anything will come of the present agitation.

A report on the German bicycle industry represents it as being in a state of utter depression owing to heavy price cutting. Efforts to organize the trade have been made again, but without success. The automobile trade is also apparently approaching a critical stage owing to too rapid expansion, which has led to overproduction. The competition of American machines is also growing to be a serious factor. Even in Germany cheap American motor cars are finding a growing market.

The Machinery Trade Less Cheerful

Latest reports from the machinery trade are less cheerful than hitherto. It is recognized that the boom period has passed, and manufacturers say that they derived no great advantage from it owing to the heavy competition, continued advances in wages, and advances in the cost of raw materials. Too many shops have been built, and hence the position of the individual manufacturer has been made harder. One bright feature is mentioned, namely, the success of German machine builders in foreign markets, especially the makers of electrical machinery. The new American tariff is not expected to change the situation for German machinery in the American market; only such German machinery will find a market in the United States as is not made there at all, or made of inferior quality. New orders are coming in at the

German factories but slowly, as the stringency of the money markets continues to hold back many undertakings which would otherwise be realized. Nevertheless, the majority of the machinery shops have orders in hand to last them for several months. Various branches of the trade are discussing ways and means for effecting closer and more effective organizations.

British Markets Feel Financial Unrest

Pig Iron Depressed—Semi-finished Steel
Weak—More Standard Oil Buying

(By Cable)

LONDON, ENGLAND, June 11, 1913.

Pig iron is greatly depressed. In fact, all sections of the market are influenced by the financial unrest and the heavy liquidation in progress in securities. The present cost of producing Cleveland pig iron is estimated at 55s. Semi-finished steel is weak under French competition. The Standard Oil Company has bought 50,000 boxes of oil sizes of tin plates, July shipment, at 14s. 1½d. to 14s. 3d. Stocks of pig iron in Connal's stores are 232,540 tons, against 241,455 tons a week ago. We quote as follows:

Cleveland pig-iron warrants (Tuesday), 55s. 6d., against 58s. 9d. a week ago.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 55s. 9d., against 59s. a week ago.

Ferromanganese, £11 12s. 3d., f.o.b. shipping port.

Steel sheet bars (Welsh) delivered at works in Swansea Valley, £5 5s.

German sheet bars, f.o.b. Antwerp, 92s. 6d., no change.

German 2-in. billets, f.o.b. Antwerp, 82s. 6d., a decline of 7s. 6d.

German basic steel bars, f.o.b. Antwerp, £5 2s.

Steel bars, export, f.o.b. Clyde, £7 15s.

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £6 17s. 6d.

German joists, f.o.b. Antwerp, £5 12s. to £5 15s.

Steel ship plates, Scotch, delivered local yards, £8 7s. 6d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 5s., a decline of 5s.

Steel rails, export, f.o.b. works port, £6 15s.

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 13s. 9d., a decline of 3d.

New York

NEW YORK, June 11, 1913.

Pig Iron.—Few buyers seem inclined to place contracts for all their third quarter or second half requirements. The tendency is to buy, if at all, for shipment over shorter periods. In New England some business has been done, but for the most part in lots of from 100 to 300 tons. One Connecticut foundry making light castings is in the market for 1000 tons. In this district none of the inquiries talked of two weeks ago has resulted in business. Buyers recognize that cost is closely approached by some quotations recently made, but contracting is deferred in the hope of getting further reductions, even though they may prove to be small. There is some quiet buying and it is probable that every important seller has been able to reach an understanding with one or more customers on iron needed for the next two months without having the inquiry generally sent out. Pennsylvania and Virginia furnaces have done some of the New England business on low quotations. Canal freight from Buffalo to Sound points would permit of laying down No. 2 X foundry iron there at \$16 to \$16.25, and at tidewater at \$15.65 to \$15.90. At some New Jersey points close to tidewater, Buffalo prices would compel the lowering of quotations recently made by Lehigh Valley furnaces. Some negotiations for basic have been on in Pennsylvania. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, \$16.75 to \$17; No. 2 X, \$16.25 to \$16.50; No. 2 plain, \$16 to \$16.25. Southern iron is quoted at \$16.50 to \$16.75 for No. 1 foundry and \$16.25 to \$16.50 for No. 2.

Structural Material.—The ordinary run of new work is of small proportions and the absence of large inquiries is noticed. Bids on 20,000 tons for section 1.

routes 36 and 37, for the Brooklyn Rapid Transit's new subway elevated lines are likely to be asked for soon. Naturally, deliveries are easy. The Fore River Shipbuilding Company is reported to be in the market for 5000 tons of structural material. Recent structural awards include 200 tons for three bridges for the Pennsylvania Railroad and 200 tons for the Buffalo, Rochester & Pittsburgh, given to the American Bridge Company. Levering & Garrigues secured the contract for the New York & New Jersey Telephone Company's office building, 450 tons, and the Belmont Iron Works the contract for 300 tons for a station at Thirty-eight street and Sixth avenue for the Interborough system. The Penn Bridge Company is to build two bridges, one at Towanda and one at Athens, Pa., amounting to 1200 tons. Ravitch Brothers secured a contract for School 97 in Manhattan calling for 200 tons, one for the Times Square Improvement Company's 12-story loft building of 700 tons and for a loft building of 12 stories at 110 West Twenty-fifth street for the Nodrog Realty Company, 500 tons. L. F. Shoemaker & Co. took a 200-ton contract for New York Central subway work between Forty-third and Forty-eighth streets, as well as canopy work for the terminal for the same railroad. The contract for the extension to the plant of the E. W. Bliss Company, Brooklyn, calling for 600 tons, was awarded to the Heddon Iron & Steel Company, as well as 200 tons for the Home for Working Girls at West One Hundred and Twentieth street. Mill shipments are obtainable in five to six weeks at 1.61c., New York, and at 2.10c. to 2.15c. from store.

Plates.—The market is quieter, new demand being very light and deliveries considerably easier. The mills are busy on contracts and the change in sentiment is not pronounced. The Fore River Shipbuilding Company is reported to be in the market for 8000 tons of plates and the possibility of the six 10,000-ton Hamburg-American ships for the Panama service being built in this country is exciting considerable interest. There has been no railroad car buying of consequence. One contract entered into the past week was for 100 flat cars for the Atlantic Coast Line, awarded to the American Car & Foundry Company. Bids for the 400 steel hopper cars for the Southern Railroad went in yesterday. Quotations for plates continue at 1.61c. to 1.66c., New York, for mill shipment in the last half. Considerable business is being done on the 1.50c. Pittsburgh basis, for delivery in two to four weeks, or 1.66c. New York, though the 1.76c. quotation for prompt shipment is still reported.

Bars.—Bars are fairly active and cancellations are few. Buyers are making contracts for last half without any great hesitancy. The opinion still prevails that good crops will necessitate a good volume of buying and that the present volume of orders will continue to be replaced as time goes on. The range of prices continues wide, figures being all the way from 1.50c. to 1.70c. at mill, depending on conditions and character of product. We quote bar iron at 1.60c. to 1.65c., New York, and steel bars at 1.56c., New York, deliveries depending on the mill. Store prices are 2c. to 2.05c. for steel bars and 2.05c. to 2.10c. for iron bars.

Old Material.—The market is flat. Not only are inquiries lacking, but consumers do not even feel disposed to take advantage of bargains offered to them. The old material trade is suffering more than ever from superabundance in the supply. Steel works and rolling mills are reported to have ample stocks, while railroad companies are making continuous offerings of track and shop material. On some classes of scrap recently in demand, no market appears to exist at present. Dealers state that the conditions were hardly worse in 1907-8. Quotations are about as follows, per gross ton, New York:

Old girder and T rails for melting.....	\$9.00 to \$9.50
Heavy melting steel scrap.....	9.00 to 9.50
Relaying rails.....	22.00 to 22.50
Rolling rails (nominal).....	12.50 to 13.00
Iron car axles.....	22.50 to 23.00
Steel car axles.....	14.50 to 15.00
No. 1 railroad wrought.....	12.00 to 12.50
Wrought iron track scrap.....	11.50 to 12.00
No. 1 yard wrought, long.....	11.25 to 11.75
No. 1 yard wrought, short.....	10.25 to 10.75
Light iron.....	4.00 to 4.50
Cast borings.....	5.75 to 6.00
Wrought turnings.....	5.75 to 6.00
Wrought pipe.....	9.00 to 9.25
Car wheels.....	12.00 to 12.50
No. 1 heavy cast, broken up.....	10.50 to 11.00
Stove plate.....	8.75 to 9.25
Locomotive grate bars.....	7.50 to 8.00
Malleable cast.....	9.00 to 9.50

Cast Iron Pipe.—The City of Hartford, Conn., will open bids June 16 on 15,000 tons of 42-in. pipe. Busi-

ness with private buyers continues lively. Inquiries are keeping up and a considerable proportion of them results in orders. Carload lots of 6-in. are quoted at \$23 to \$24 per net ton, tidewater New York, some makers asking more.

Ferroalloys.—The market in 80 per cent. ferromanganese is unchanged. The principal agencies reiterate their quotation of \$61, Baltimore, while admitting that occasional small lots of resale material are let go at concessions. Inquiry is for small lots only. Quiet prevails also in the market for 50 per cent. ferrosilicon, quotations for which continue at \$75, Pittsburgh, for carloads, \$74 for 100 tons and \$73 for 600 tons and over.

Boston

BOSTON, MASS., June 10, 1913.

Old Material.—Buyers are taking little material. Some of the producers are holding back. Whatever scrap comes out is being absorbed by the larger distributors. Prices are unchanged. The general opinion is that they will remain at the present level probably until August. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of \$2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel.....	\$9.00 to \$9.50
Low phosphorus steel.....	13.50 to 14.50
Old steel axles.....	13.50 to 14.00
Old iron axles.....	21.00 to 21.50
Mixed shafting.....	13.00 to 13.25
No. 1 wrought and soft steel.....	10.25 to 10.50
Skeleton (bundled).....	7.50 to 8.00
Wrought-iron pipe.....	8.50 to 9.00
Cotton ties (bundled).....	8.50 to 9.00
No. 2 light.....	3.50 to 4.00
Wrought turnings.....	5.50 to 6.00
Cast borings.....	5.50 to 6.00
Machinery, cast.....	11.50 to 12.00
Malleable.....	10.00 to 10.50
Stove plate.....	7.75 to 8.25
Grate bars.....	6.75 to 7.00
Cast-iron carwheels.....	13.50 to 14.00

Metal Market

NEW YORK, June 11, 1913.

The Week's Prices

Cents Per Pound for Early Delivery									
Copper, New York.		Electro-	Tin,	Lead—		Spelter—			
June	Lake.	lytic.	New York.	New York.	St. Louis.	New York.	St. Louis.	New York.	St. Louis.
5.....	15.75	15.25	45.60	4.35	4.20	5.25	5.10		
6.....	15.75	15.25	46.15	4.35	4.20	5.25	5.10		
7.....	15.75	15.25		4.35	4.20	5.25	5.10		
9.....	15.75	15.25	45.45	4.35	4.20	5.25	5.10		
10.....	15.75	15.25	45.25	4.35	4.20	5.15	5.00		
11.....	15.75	15.25	45.00	4.35	4.20	5.15	5.00		

Copper is quiet at nominal prices, which have a downward tendency. Tin is lower and except on one day business was lacking. Lead is quiet, but firm. The decline of spelter in a dull market has continued. The weakness of antimony is still its feature.

New York

Copper.—The market has been quiet and prices continue nominal. Late last week there were some small sales of electrolytic at 15.37½c., cash, 30 days, delivered, equal to 15.25c., cash, New York. Reports that some resale lots of electrolytic have been sold down to 15c. have been current. They are accepted as true, but the circumstances are regarded as exceptional in that a buyer was practically stumbled upon and it is not considered that these sales make the market. The London market is considerably softer, having declined £1 7s. 6d. for spot and £1 5s. for futures since June 4. Although the large agencies have announced no change in prices, the market has unquestionably given evidence of a downward trend. Lake copper is quoted nominally in New York to-day at 15.75c. and electrolytic at 15.25c. London quotations this morning are £65 7s. 6d. for both spot and futures. The exports so far this month total 6780 tons.

Pig Tin.—Extreme quiet has prevailed except on last Monday when about 300 tons was sold for delivery in various months. On that day prices for spot were 45.37½c. to 45.50c.; for July, 45.37½c., and for August, 45.10c. to 45.12½c. At the close there were willing buyers at these prices, but no sellers. Prices worked up

during the day and September delivery went to 45.25c., but sellers held back. The feature of the moment is the concentration of spot supplies. There is ample tin to meet impending demand, but it is almost entirely confined to the control of one interest. London has declined steadily in the last few days and this morning quoted £204 10s. for spot and £205 for futures. The New York price this morning is 45c. The arrivals this month total 1170 tons and there is afloat 1485 tons.

Lead.—This metal is dull and uninteresting in a domestic way, there being little pressure to sell and little inclination to buy. In London, however, lead is going up, and if its course continues in that direction it will lead to advances here. The London quotation to-day is £20 7s. 6d., equivalent to 4.36c., New York. If the London figures should advance equal to 15 points, New York, which would cover freight to London, English buyers could profitably come to this market. The New York price is 4.35c. and that in St. Louis 4.20c.

Spelter.—Although there were some reports early in the week of sales for future delivery, consumers show no inclination to take up June or July metal and it is weaker at 5.15c., New York, and 5c., St. Louis.

Antimony.—With not sufficient business to fully test the market, antimony is dull and weak at prices below the import cost. Hallett's is quoted at 8.20c., Cookson's at 8.70c. and Chinese and Hungarian grades at 7.25c. to 7.50c. All these prices could probably be shaded a few points.

Old Metals.—Consumers are buying sparingly. Dealers' selling prices are lower, being nominally as follows:

	Cents per lb.
Copper, heavy and crucible.....	14.75 to 15.00
Copper, heavy and wire.....	14.50 to 14.75
Copper, light and bottoms.....	13.00 to 13.25
Brass, heavy.....	9.25 to 9.50
Brass, light.....	8.00 to 8.25
Heavy machine composition.....	13.50 to 13.75
Clean brass turnings.....	8.75 to 9.00
Composition turnings.....	11.50 to 12.50
Lead, heavy.....	4.25
Lead, tea.....	4.00
Zinc, scrap.....	4.25

Chicago

JUNE 9.—Buying of metals for spot shipment has been moderately active but there is little or no interest in futures. The market is accordingly dull, with tendencies toward weakness. We quote as follows: Casting copper, 15.75c.; Lake, 16c. to 16.25c. in carloads for prompt shipment; small lots, 1/4c. to 3/4c. higher; pig tin, carloads, 48c., small lots, 50c.; lead, desilverized, 4.35c. to 4.40c.; corroding, 4.60c. to 4.65c., for 50-ton lots; in carloads, 2 1/2c. per 100 lb. higher; spelter, 5.35c. to 5.40c.; Cookson's antimony, 10.50c., and other grades, 9.75c., in small lots; sheet zinc is \$7.50 f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 14c.; copper bottoms, 13c.; copper clips, 13.75c.; red brass, 13c.; yellow brass, 9.75c.; lead pipe, 3.90c.; zinc, 4.35c.; pewter, No. 1, 33c.; tin foil, 40c.; block tin pipe, 44c.

St. Louis

JUNE 9.—Lead and spelter have been dull and the latter somewhat weaker. Lead closed at 4.22 1/2c.; spelter, 5.15c.; tin, 46.35c. to 46.85c.; Lake copper, 16.22 1/2c. to 16.35c.; electrolytic copper, 15.85c. to 16.10c.; antimony, Cookson's, 9.10c. to 9.35c. In the Joplin ore market the top price for zinc blende, for which the basis price for 60 per cent. was \$42 to \$44.50, was \$46 per ton, but the lower grades brought settlements as low as \$35. The general tone of the market was 50c. to \$1 per ton lower than the preceding week. Calamine was steady at \$20 to \$21 for 40 per cent., while the better grades brought as high as \$24. Lead ore was rather quiet and unchanged from the preceding week at \$52.50. We quote miscellaneous scrap metals as follows: Light brass, 6c.; heavy brass and light copper, 9.50c.; heavy copper and copper wire, 11c.; zinc, 3.50c.; lead, 3.50c.; pewter, 25c.; tin foil, 34c.; tea lead, 3c.

The Burchard-Roberts-Wales Company, Cleveland, Ohio, has been incorporated with a capital stock of \$10,000 to engage in engineering, taking over the business of the late Anton Burchard at 1104 Swetland Building. In addition to the Burchard estate, those interested in the company are A. B. Roberts, recently chief engineer of the American Fork & Hoe Company; H. S. Wales, sales engineer for the Westinghouse Electric & Mfg. Company, and P. H. Withington, director of the American Fork & Hoe Company. Mr. Withington will be president of the new company.

Iron and Industrial Stocks

NEW YORK, JUNE 11, 1913.

Under various unfavorable influences, chiefly the pressure for money in Europe, the stock market declined last week day after day and this week a worse development took place in the Supreme Court decision on the Minnesota freight rate cases which caused almost a smash on Tuesday. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Am. Can., com.....	21 1/2 - 30	Railway Spring, com.	22 1/2 - 25 1/2
Am. Can., pref.....	80 1/2 - 89 1/2	Railway Spring, pref.	90 1/2 - 92
Am. Car & Fdy., com.	36 1/2 - 45 1/2	Republic, com.....	17 - 20 1/2
Am. Car & Fdy., pref.	108 - 109 1/2	Republic, pref.....	72 1/2 - 80
Am. Loco., com.....	27 - 30 1/2	Rumely Co., com.....	20 - 23
Am. Loco., pref.....	102	Rumely Co., pref.....	42 1/2 - 47 1/2
Am. Steel Foundries	25 - 30	Sloss, com.....	25 - 29
Bald. Loco., com.....	40 - 43	Sloss, pref.....	38
Bald. Loco., pref.....	102 1/2 - 105 1/2	Pipe, com.....	9 1/2 - 10
Beth. Steel, com.....	25 - 31 1/2	Pipe, pref.....	44 1/2
Beth. Steel, pref.....	62 1/2 - 69	U. S. Steel, com.....	50 1/2 - 56 1/2
Case (J. I.), pref.....	99 1/2 - 99 1/2	U. S. Steel, pref.....	102 1/2 - 105
Colorado Fuel.....	24 1/2 - 28 1/2	Va. I. C. & Coke.....	37 1/2 - 38
Deere & Co., pref.....	95 1/2 - 97	Westinghouse Elec.	53 1/2 - 59 1/2
Emer-Brant, com.....	24 1/2 - 25	Am. Ship, com.....	50 - 51
General Electric.....	129 1/2 - 135 1/2	Am. Ship, pref.....	97 1/2
Gr. N. Ore Cert.....	25 1/2 - 31 1/2	Chic. Pneu. Tool.....	48 - 49 1/2
Int. Harv., com.....	96 - 104	Cambria Steel.....	41 - 45
Int. Harv., Corp.....	95 1/2 - 104	Lake Sup. Corp.....	22 - 24 1/2
Int. Pump, com.....	6 - 7 1/2	Crucible Steel, com.	11 1/2 - 13 1/2
Int. Pump, pref.....	22 1/2 - 27 1/2	Crucible Steel, pref.	82 1/2 - 87 1/2
Lackawanna Steel.....	29 1/2	Harb. Wk. Ref., com.	43 - 45 1/2
Nat. En. & St., com.	9 - 9 1/2	Harb. Wk. Ref., pref.....	101
Pressed Steel, com.	18 1/2 - 22	La Belle Iron, com.	40 - 42
Pressed Steel, pref.....	88 1/2 - 93	La Belle Iron, pref.	120 1/2 - 121

Dividends Declared

The American Car & Foundry Company, regular quarterly, 1 1/4 per cent. on the preferred stock and of 1/2 of 1 per cent. on the common stock, payable July 1.

The American Can Company, regular quarterly, 1 1/4 per cent. on the preferred stock, payable July 1.

The Western Electric Company, regular quarterly, 2 per cent., payable June 30.

The Bethlehem Steel Company, regular quarterly, 1 1/4 per cent. on the preferred stock, payable July 1.

The Canadian General Electric Company, Ltd., regular quarterly 1 1/4 per cent. on the common stock, payable July 1.

The Ingersoll-Rand Company, 3 per cent. on the preferred stock, payable July 1.

The Burt Mfg. Company, Akron, Ohio, has recently booked a large number of good orders for ventilators, among which are the following: Sixty 24-in. for the Union Stock Yards Company, Omaha, Neb.; ninety 20-in. for the Jones & Lamson Machine Company, Springfield, Vt.; six 48-in., with fan, to be operated by direct connected motors, for the East Pittsburgh plant of the Westinghouse Electric & Mfg. Company; five 40-in. and one 18-in. for a school building in Metropolis, Ill.; three 36-in. for the State agricultural station at Mandan, N. D.; six 54-in. for the American Plate Glass Company, James City, Pa.; eight 16-in. for the Borden Condensed Milk Company, and, ten 12-in. for the Wason Mfg. Company, Springfield, Mass., for use on railroad cars. This company has also received an order for two No. 3 Cross oil filters for the Bushwick High School, New York City.

The annual industrial excursion of the Chamber of Commerce, Cincinnati, Ohio, took place June 3. A special train conveyed a party of about 150 from the Pennsylvania Railroad Company's Butler street depot to the Newport Rolling Mill, Newport, Ky. After a thorough inspection of the plant, under the guidance of the company's officers, the party was taken to the Andrews Steel Company's mill, East Newport. On the return trip a stop was first made at the Stewart Iron Works, Covington, Ky., where refreshments were served. The excursionists then visited the plant of the Houston, Stanwood & Gamble Company, and wound up the day as guests at a Dutch luncheon, served by the Bavarian Brewery.

The Merchants' and Manufacturers' Association and the Cincinnati Business Men's Club, both of Cincinnati, Ohio, have adopted resolutions not only approving of the proposed 5 per cent. advance in railroad freight rates but recommending that the Interstate Commerce Commission grants the request of the companies. It is stated that other business organizations in the Central West are considering the passage of similar resolutions.

Pittsburgh and Vicinity Business Notes

The United Engineering & Foundry Company, Pittsburgh, is building all the shears and roll lathes for the new sheet and tin mill plant of the Trumbull Steel Company at Warren, Ohio, and is also putting through a 30-in. bar mill, tables, hot beds, shears, etc., for the new open-hearth plant of the Leetonia Steel Company, at Leetonia, Ohio.

The Riter-Conley Mfg. Company, Pittsburgh, has received a contract from the Trumbull Steel Company for a 100-ft. extension to its galvanizing department.

The Turner-Fricks Mfg. Company, Farmers' Bank Building, Pittsburgh, has sold to the H. J. Heinz Company, Pittsburgh, a 250 hp., four-cylinder, vertical gas engine to operate a generator in its power plant.

The Davis Brake Beam Company is building and equipping new shops at Johnstown, Pa. Two shop buildings will be each 55 x 80 ft. and a power house 20 x 30 ft. New equipment purchased consists of one Deming vertical triplex pump, delivering 90 gal. per minute at 1600 lb. per sq. in. pressure; one 125-hp motor, with variable speed control; one Watson-Stillman hydraulic accumulator, 10-in. by 1 ft. stroke, and various small motors and equipment for handling material. The company will move from Wilmington, Del., to Johnstown, its extensive hydraulic equipment for making the Davis solid truss brake beam and pressed steel journal box lids. In addition the company is building a machine to make trussed brake beams.

The Des Moines Bridge & Iron Works, Curry Building, Pittsburgh, has received an order from the city of St. Thomas, Ontario, Canada, for a 600,000-gal. steel water tower, to take 215 tons of plates and shapes; from the Consolidated Rendering Company for a 30,000-gal. steel water tank; from Montgomery Brothers & Co., of Buffalo, N. Y., for a 60,000-gal. tank; from the Chesapeake & Ohio Railroad for a 100,000-gal. tank to be built at Thurmond, W. Va.; and an order from the Bureau of Fisheries for a 26,000-gal. tank, to be built at Louisville, Ky. The report that the Des Moines Bridge & Iron Works had recently bought land adjoining its works on Neville Island, Pittsburgh, on which large extensions would be built, is untrue. It filed a deed for property bought some time ago, but has no additions planned for the present.

The J. P. Koehler Company, smelter and refiner of metals, Pittsburgh, will build a smelter works of fireproof steel construction, 72 x 100 ft., on a site recently purchased, and has bought about \$6,000 worth of new machinery.

The Scottdale Foundry & Machine Company, Scottdale, Pa., has been reorganized under the name of the Scottdale Machine & Mfg. Company, with E. A. Humphries president. The company manufactures coal and coke handling equipment. Recent orders received for such apparatus include one for coal hauling and screening from the Provident Coal & Mining Company, Kelly Station, Pa.; one for picking and screening from the Gilliam Coal & Coke Company, Gilliam, W. Va., and one for conveying and screening from the Glen Alum Coal Company, Glen Alum, W. Va.

The Thomas Carlin's Sons Company, Pittsburgh, is building one 7-ft. stationary grinding pan for the Chicago Bearing Metals Company; one 6-ft. standard wet pan and two 35-hp. electric hoists for the H. Koppers Company; one 9-ft. dry pan, one 9-ft. mud mixing pan with self unloading device and one 9-ft. wet pan for the Carnegie Steel Company; a No. 61 shear for Charles McDermott, Brooklyn, N. Y.; a No. 3 shear for Louis Sukernek, Buffalo, together with a number of shears of smaller sizes.

The Cavert Wire Company, Ellwood City, Pa., incorporated under the laws of Pennsylvania, has acquired a tract of 3½ acres and will erect a plant, to be of brick and steel construction, which it is claimed will be one of the largest of its kind in the country for the manufacture of bale ties and baling wire. It will be operated electrically. George B. Cavert, president and treasurer of the company, together with a corps of assistants associated with him for the past 15 years, has designed and perfected important automatic machinery which the company is building at its own shops for the manufacture of wire specialties, such as hook, cross-head and single loop bale ties and

annealed steel baling wire used for the baling of hay, straw, etc. Mr. Cavert has had long experience in this branch of trade, having begun with the Kilmer Mfg. Company in 1886, and subsequently being manager, secretary, treasurer and president of the Griswold Wire Company. The new plant will have direct connections with the Pittsburgh & Lake Erie, Pennsylvania, Baltimore & Ohio, and Buffalo, Rochester & Pittsburgh railroads.

The Standard Underground Cable Company will build a new office and factory building at Sixteenth and Pike streets, Pittsburgh. It will be 50 x 115 ft., of steel frame, brick and concrete construction. The company will move its general offices there from the Westinghouse Building and from its works in Canada and in Perth Amboy, N. J.

The Reliance Coke Company, Germania Bank Building, Pittsburgh, is making rapid progress in the completion of its new plant at Denbeau, Pa., and expects to be making coke in July. A total of 240 coke ovens of the pusher type is being built. Orders placed for equipment include 600-hp. Rust boilers, Buckeye engines direct connected to Westinghouse generators of 400-kw. capacity, Vulcan hoisting engines and equipment, and General Electric locomotive haulage.

The Gibson Motor Car Company, Oliver Building, Pittsburgh, will not build its new plant at Avonmore, Pa., as had been expected, but at Alliance, Ohio, where 12 acres of ground have been secured with about a quarter of a mile frontage on the Pennsylvania Lines West. The plant will consist of two main buildings, 85 x 255 ft., each to be of brick and steel construction, one story. There will also be a repair shop, 50 x 60 ft., and an office building, 40 x 50 ft., of the same general design. The company will build a full line of automobiles, consisting of roadsters and five and seven-passenger touring cars and the Gibson motor truck. The plant is expected to be ready about January 1. The company has not yet made out a list of the metal working tools that will be needed but will soon be in the market for lathes, planers, drill presses, shapers and other tools and for considerable electrical and steam equipment. C. E. Gibson is president, and other officers will be elected later.

The Keystone Construction Company, Pittsburgh, has been awarded a contract to build the new plant of the Pittsburgh Armature Works in the West End in that city. The main building is to be of brick and steel, 66 x 107 ft.

The Union Drawn Steel Company, Beaver Falls, Pa., maker of shafting and cold rolled specialties, has recently made important additions to its equipment, including an 800-hp. Buckeye steam engine, a 600-kw. General Electric generator and two 250-hp. Wickes water-tube boilers, making a total of four boilers of this type, which will be fired by Green stokers. The power house has been equipped with a 300-hp. turbine pump that will take water from the Beaver River for the entire plant. A steel tank, the largest in the Beaver Valley, has been erected to store the water. A new department has been equipped with wood-working tools for making boxes for shipments. The entire power plant has now double its former capacity.

The regular meeting of the Pittsburgh Society of Supply Salesmen will be held in that city on Saturday, June 14, and will be addressed by W. T. Todd, secretary of Somers, Fittler & Todd, on "Qualifications of Salesmanship."

The A. Garrison Foundry Company has received an order from the Otis Steel Company for all the rolls and a grinding machine to be installed in its new open-hearth steel plant at Cleveland, Ohio.

The two new blast furnaces under construction by the Pittsburgh Steel Company at Monessen, Pa., will be later in getting started than expected. It is not believed now that the first furnace will be ready for operation before August 1 and the second about a month later.

The Pittsburgh Shovel Company, Oliver Building, Pittsburgh, works at Leechburg, Pa., has appointed Butler & Brittain, San Francisco, as its agents for the Pacific coast.

A new record for relining and repairing a blast furnace was recently made in the Pittsburgh district. On April 22, No. 1 Carrie furnace of the Carnegie Steel Company at Rankin, Pa., was blown out, and the furnace was blown in again at 2 p. m. on Saturday, May 31. In 39 days the

furnace was completely relined, and the working level was raised about 6 ft. to put the furnace above high water mark. The bosh was enlarged from 20½ to 22 ft., and the capacity of the furnace has been increased from about 325 tons per day to about 400 tons. This No. 1 furnace is one of the original two furnaces built by the Fownes interests at Pittsburgh many years ago, and which later were taken over by the Carnegie Company.

The Pennsylvania Rubber Company, Jeanette, Pa., will erect a new factory building, 150 x 200 ft., six stories, to be of steel, reinforced concrete and brick, and a fireproof power house of steel and concrete, 85 x 125 ft. The several power plants of the works will be installed in the new building, where electric current will be generated with two turbo generators, and the equipment of the plant will be operated by individual motors.

The Pittsburgh Crucible Steel Company has put fire in six of its eight new open-hearth furnaces at Midland, Pa., and expects to start them within two weeks. The other furnaces are to be lighted in about a month. This company has sent out specifications for 22 electric cranes on which crane builders are now figuring. The blast furnace of this company has now been running over seven years on one lining; it makes about 14,000 tons of iron per month, and so far has made on the present lining about 1,200,000 tons. The company will be a heavy buyer of steel scrap for its open-hearth plant.

The Riter-Conley Mfg. Company, Pittsburgh, has received a rush order for 1600 ft. of 10-in. pipe from the city of Los Angeles, Cal., for a new syphon for the aqueduct and is to deliver it in Los Angeles in 35 days from date of order.

The Wilson-Snyder Mfg. Company, Pittsburgh, has received an order for two 10,000,000-gal. turbine drive centrifugal pumps to be installed in the new open-hearth steel plant of the Carnegie Steel Company at Bessemer, Pa., and has sold another pump of similar design and capacity to be installed in a sugar works in Cuba.

Personal

George Roemer Woods, who has been in charge of the New York office of the Allied Machinery Company of America for many months, on the evening of June 11 graduated with honors from the New York Law School. He pursued his studies despite daily attention to the machinery business and frequent trips out of the city.

Julian Kennedy, consulting engineer, Pittsburgh, has declined to accept a contract for drawing plans for a filtration plant for the city of Youngstown, Ohio.

John McHugh has been appointed assistant superintendent of the Farrell works of the American Steel & Wire Company, at Farrell, Pa., succeeding Frank Phillips, who has resigned to engage in other business.

Charles T. Fairbairn, Southern district manager Republic Iron & Steel Company, Birmingham, Ala., will be kept from his office for some time by injuries received in an automobile accident.

Col. Charles M. Jarvis has resigned as president of the American Hardware Corporation, New Britain, Conn., and at a meeting of the company held last week Henry C. M. Thomson, New York City, was elected to the office. Colonel Jarvis will remain a director, while Mr. Thomson will fill the place on the board made vacant by the death of Charles H. Parsons. C. F. Smith, president of Landers, Frary & Clark, who has been the acting head of the American Hardware Corporation during Colonel Jarvis's illness, was elected to a new office, chairman of the board of directors. Carlisle S. Baldwin was made manager in charge of the Corbin Cabinet Lock Company, and George P. Spear assistant manager of the Corbin Screw Company, these being new offices in the administration of divisions of the corporation. Mr. Thomson was at one time Western manager of the P. & F. Corbin Company.

James D. Rhodes has been elected a director and a member of the executive committee of the Pittsburgh Valve, Foundry & Construction Company, succeeding J. Grant Anderson, deceased. Mr. Rhodes is president of the Pennsylvania Casting Machine Company and the National Car Wheel Company.

T. J. Bray, president Republic Iron & Steel Company, who sailed for Germany June 10 with the Mechanical Engineers, will make a study of by-product coke plants and will also visit steel works in France and Belgium.

H. L. Watson, member of the American Society of Mechanical Engineers, formerly sales engineer with the Allis-Chalmers Mfg. Company, Milwaukee, has accepted the position of sales manager for the De Laval Steam Turbine Company, Trenton, N. J.

Albert Broden, Reading Iron Company, Reading, Pa., and recently president of the Eastern Pig Iron Association, has been honored by the King of Sweden with a decoration of knighthood of the Order of Vasa, first class. Mr. Broden has been active in promoting the commercial relations between the United States and Sweden, being particularly identified with the introduction and importation of Swedish iron ore, which has been extensively used by eastern Pennsylvania furnaces.

H. Koppers, who has been in the United States on an extended visit, has returned to Germany.

Percival Roberts, Jr., a director of the United States Steel Corporation, will spend the summer in Europe.

T. J. Drummond, president Lake Superior Corporation, Montreal, Quebec, is recovering from a serious illness.

John R. Hastings, sales manager of the Ohio Steel Foundry Company, Lima, Ohio, has resigned to become vice-president of the Alton Steel Company, Alton, Ill., now building a plant for the manufacture of steel hoops. He has had much experience in the steel hoop trade, first with William Clark & Sons, Pittsburgh, then as general purchasing agent of the American Steel Hoop Company and afterward with the Sharon Steel Hoop Company, of which he was a director and vice-president until 1906, when he sold his interest. In 1909 he became identified with the Ohio Steel Foundry Company. In his new position he will have his office in St. Louis. On the evening of June 4 a dinner was given to him at the Lima Club as a farewell tribute. In behalf of the officers of the Steel Foundry Company he was presented with a diamond scarf pin and social friends gave him a set of diamond cuff links and other articles of beauty and value.

Henry J. Fuller, president Canadian Fairbanks-Morse Company, Ltd., Montreal, has been elected vice-president of Fairbanks, Morse & Co., whose head office is in Chicago, Ill. He will have charge of the Eastern business of the company, with his headquarters in New York, but will continue as president of the Canadian company, to which he will give his first consideration, spending a considerable portion of his time in Canada. He is also a director of the Canadian Bank of Commerce, the National Trust Company, the Amalgamated Asbestos Corporation and other Canadian institutions.

The Heppenstall Forge & Knife Company, Pittsburgh, announces the appointment of E. H. Graham superintendent of its order department and L. H. Bowman, formerly of the Carnegie Steel Company, general manager of sales.

A. L. Andrews, president and treasurer Newport Rolling Mill Company, Newport, Ky., has returned from a vacation trip to Florida.

E. D. Moody, cashier of the Dennison National Bank, has been appointed receiver for the Dennison Foundry & Machine Company, Dennison, Ohio.

Failure of James Watson & Co.

James Watson & Co., pig iron merchants, Glasgow, Scotland, have failed. The firm is reported to have organized the recent corner in Cleveland pig iron warrants. Peter Donaldson, president Dayton Coal & Iron Company, Dayton, Tenn., is a member of the firm.

I. B. Williams & Sons, Dover, N. H., are placing upon the market for general sale their Cochecho belt cement. It is stated that this cement is made from the same formula that, with few changes, has been used in the manufacture of the company's Cochecho leather belting for the past seventy years.

Obituary

Charles H. Cramp

Charles H. Cramp, former head of the shipbuilding firm of William Cramp & Sons, Philadelphia, Pa., died in that city June 6, aged 85 years. He was born in Philadelphia and was the son of William Cramp, who founded on the Delaware River in 1830 the plant that has become one of the greatest shipbuilding companies in the world. The son was educated in the public schools and was graduated from the Central High School in his native city. Immediately thereafter, before he was 17, he began to learn the practical work of ship construction in the yards of his uncle, John Birely. Three years later he went to work for his father, continuing under his direction in the study of naval architecture until 1859, when he became a partner in the business, then known as William Cramp & Sons. In 1870, after the death of his father, Charles H. Cramp became the head of the business, which in 1872 had been incorporated as the William Cramp & Sons' Ship & Engine Building Company. From that time on the establishment was an important factor in the building of the new American navy, and similarly in the development of foreign navies. Mr. Cramp retired from active work in 1903 because of his advanced age, but continued to give the company the benefit of his advice.

From the time of its organization Mr. Cramp was actively identified with the Philadelphia Museum, and in 1899 he became president of the board of trustees. For many years he was a manager of the Franklin Institute, a member of the Board of Port Wardens and a director of the Union League. He was interested in all projects that tended toward the advancement of the commercial prominence of the city. In the vast plant of which he was the head for many years he was well known to its thousands of employees, and was approachable to even the most humble.

Mr. Cramp was twice married and was the father of seven children, three of whom are still living. He followed the example of his father in taking his sons into the shipbuilding business. Up to the time of his death the late Henry W. Cramp was vice-president and treasurer of the company; Edwin S. Cramp was superintending engineer for many years; Francis L. Cramp is still connected with the estimating department of the plant, and Courtland D. Cramp is in the sales department.

ORRAN W. KENNEDY, general manager Orient Coal & Coke Company, Uniontown, Pa., died in St. Francis Hospital, Pittsburgh, June 8 of pneumonia, aged 59 years. Mr. Kennedy was born in Lawrence County Pa., and had been in the coke business since 1891. In July, 1897, when Thomas Lynch became president of the H. C. Frick Coke Company, Mr. Kennedy was made general superintendent of the company. He held this position until January 1, 1904, when he resigned to become general manager of the Orient Coal & Coke Company, an independent concern. At a meeting of the directors of this organization May 15 Mr. Kennedy handed in his resignation, to take effect October 1, 1913. He was president of the Fayette Title & Trust Company, Uniontown, Pa. He leaves a widow and two daughters.

LEWIS L. ABBOTT, a partner in the firm of Dickerson, Van Dusen & Co., 32 Cliff street, New York, dealers in sheets, tinplate and metals, died May 26 at his home, 153 West Seventy-third street, New York, aged 68 years. Mr. Abbott, who was born in Andover, Mass., spent 21 years as the representative of his firm in Liverpool, England, returning to this country in 1897. He was a graduate of Yale, class of 1866, and a member of the Alpha Delta Phi fraternity. He leaves a daughter and three sons.

MICHAEL GREENWOOD, president Greenwood Construction & Supply Company, Pittsburgh, died in a hospital in that city June 2, after a short illness, aged 63 years. He went to Pittsburgh in 1888 as superintendent of the Hall Steam Pump Company, and had been identified with the Laidlaw-Dunn-Gordon Company, the Henry R. Worthington Company and the Snow Steam Pump Company. In 1907 he organized and became president of the Greenwood Company.

GEORGE HAMPTON SMITH recently died at Aspinwall, Pa., from pneumonia, aged 34 years. He was a blast furnace expert in the employ of the Carnegie Steel Company. Entering the service of that company as a draftsman on blast furnace work, he became a specialist in construction. His most recent work was in remodeling the furnaces of the company at its Edgar Thomson plant.

EUGENE O. BLETHEN, San Francisco, died suddenly at his home in Oakland, Cal., May 27, from apoplexy, aged 58 years. He was a member of the firm of Holbrook, Merrill & Stetson, jobbers of hardware and allied merchandise. He had been prominent in local business circles for many years. He leaves a widow and a daughter.

CHARLES J. RINKER, who for 15 years represented the Lukens Iron & Steel Company, Coatesville, Pa., as salesman in New York State and eastern Pennsylvania, died at Hammonton, N. J., June 6, aged 38 years. He had been in poor health for several years. He leaves a widow and three children.

The Monarch Engineering & Mfg. Company, Baltimore, Md., and the Quigley Furnace & Foundry Company, Springfield, Mass., have divided between them the rights, patterns, drawings and blue prints of the bankrupt Rockwell Furnace Company, New York. The Monarch Company will hereafter manufacture the Rockwell oil and gas appliances and other apparatus in connection with melting furnaces, including the Rockwell type of double chamber and simplex furnaces, burners of all kinds, portable heating equipment for forge and rivet work, lead melting, etc., and pumps, blowers and soft metal equipment. The Quigley Company will manufacture other furnaces of the Rockwell list for general heating purposes. Each of these companies will hereafter be able to supply the repairs needed for the furnaces it has taken over.

The William Tod Company, Youngstown, Ohio, has received an order from the Otis Steel Company, Cleveland, Ohio, for two jobbing mills, one 30 x 54 in. and one 30 x 60 in., and one 30 x 78 in. roughing mill stand; also two 30 x 54 in. and one 30 x 72 in. finishing stands. They are to be installed in the new open-hearth steel plant. The William Tod Company has also received an order from the city of Akron, Ohio, for a 10,000,000 gal. reciprocating water works pump to cost \$78,000 installed.

The smoke ordinance of Columbus, Ohio, prohibits the emission of dense smoke (No. 3 of the Ringlemann smoke chart, for more than 6 min. in any one hour from class I stacks, which are those having an inside area at the top not exceeding the area of a circle 5 ft. in diameter; for more than 12 min. from class II stacks, which have an inside top area between the areas of 5 and 10 ft. diameter circles, or for more than 25 min. from class III stacks, which are those of greater inside top area than a 10-ft. circle.

The Phoenix Warehouse Company, Phoenix, Ariz., has changed its name to the Arizona Hardware Supply Company. This company is distributor for Arizona of the products of a number of manufacturers of iron and steel wares. It is open for additional connections with manufacturers who desire Arizona business in machinery and heavy hardware. H. P. Demund is president and H. K. Behn is secretary and treasurer.

A petition filed with the Secretary of State of Oregon will refer the workman's compensation act to the people at the November election, if it is found that the names on it are those of qualified voters. If the people approve it, the act will become effective June 30, 1914, or one year later than would have been the case otherwise. In case the petition is thrown out, the law will become effective this month.

The stockholders of the Colorado Fuel & Iron Company will hold a special meeting June 17 to authorize the transfer of all real estate to the Colorado Industrial Company for the \$14,067,000 debentures of the Fuel & Iron Company which the Industrial Company owns. This is intended as a simplification of bookkeeping accounts, creating no additional complication, financial or otherwise.

Nitrogen and Its Effect on Steel

Influence of Other Substances in Combination—Inconsistent Quality Ratings

The discussion on the effect of nitrogen on steel has become more animated since the appearance of various alloys which are used to remove this element and its compounds from steel. "E. D. A.," in a recent issue of *Metallurgical and Chemical Engineering*, gives the results of his experience and investigations on this subject.

The author concedes as a general proposition that nitrogen produces brittleness in all grades of steel, but it is not satisfactorily determined whether the defects are caused by nitrogen alone or by its conjunction with other injurious elements, such as sulphur and phosphorus. This question cannot be definitely settled until a large number of careful and complete analyses of many steels are compared with the physical properties, because thus far practically similar conditions give inconsistent results. Hardly any difference is shown in the good or bad qualities of the steel, unless the phosphorus and nitrogen contents are abnormally high.

Factors in Determining Merit of Steel

Methods of measuring the merit of a steel, as expressed in a formula, vary greatly and no definite rule has been adopted by metallurgists, since it is almost impossible to formulate one covering all conditions. C. E. Stromeyer, in a paper before the Institute of Naval Architects, London, England, which has already been referred to in these columns, gives the following rule for determining the quality, or merit, of a steel so far as phosphorus and nitrogen content are concerned. "The sum of the percentage of phosphorus and 5 times the percentage of nitrogen should not exceed 0.080 per cent. in good quality steel," and he also says "that nitrogen has a tenfold greater effect than phosphorus in raising the tenacity of steel."

In England the formula most commonly used to determine merit from physical properties is to regard elongation and tensile strength and disregard elastic limit and reduction of area. From this comes the formula:

Merit = tensile strength (tons) ÷ elongation (per cent.)

In tables 1 and 2 are given the chemical analyses and physical results of various steels as investigated by "E. D. A.":

Table 1—Complete Analysis of Samples

Test No.	Carbon	Silicon	Manganese	Sulphur	Phosphorus	Titanium	Chromium	Vanadium	Nitrogen	Duplicate Analysis on Nitrogen
1	.84	.17	.29	.009	.011	.....	...	...	.012	.010
2	.68	.20	.30	.022	.013	.080	...	...	.008	.008
3	1.01	.10	.32	.009	.014	Trace	...	...	.013	.012
4	1.28	.15	.37	.009	.013	.010	...	...	.009	.009
5	.64	.12	.25	.022	.018	.....	...	...	.003	.004
6	.48	.20	.19	.012	.008	.....	.60	.20	.006	....
7	....	Not determined	....	....	....	....	...	...	.013	.014

Summary:

- No. 1—Average of nine electric-furnace heats.
 No. 2—One electric-furnace heat to which 0.50 per cent. ferro-titanium was added.
 No. 3—One electric-furnace heat to which 0.30 per cent. rutile (red oxide of titanium) was added.
 No. 4—One electric-furnace heat to which 0.60 per cent. rutile was added.
 No. 5—Average of nine open-hearth furnace heats.
 No. 6—One heat of chrome-vanadium steel.
 No. 7—Drillings from Bessemer steel rail; only nitrogen determined.

Table 2—Physical Properties of Samples

Test No.	Elastic limit, lb.	Tensile strength, lb.	Elongation per cent.	Reduction of area per cent.	Merit, English	Merit, Stromeyer
1	68,000	105,500	18.5	46	65.5 (4)	5
2	58,400	98,400	19.5	52	63.5 (5)	3
3	69,500	105,000	21.5	42	68.5 (2)	6
4	70,400	108,900	17.5	41	66.5 (3)	4
5	53,700	95,200	17	34.5	60 (6)	1
6	82,000	123,500	19	45.5	74 (1)	2
7	.....	Not determined	.....	.....	.....	.....

Method of Nitrogen Determination

The method used to determine nitrogen was as follows:

An Erlenmeyer flask of about 750 c.c. capacity is provided with a rubber stopper which carries a funnel and tube connected to a Bunsen condenser. The funnel is

provided with a suitable stop cock. About 500 c.c. of water, to which has been added 30 c.c. of a solution of caustic soda equal in strength to hydrochloric acid of specific gravity 1.12, is put in the flask and boiled. During this preliminary boiling one gram of the sample steel is dissolved in 20 c.c. of hydrochloric acid and this solution is then put in the funnel of the Erlenmeyer flask from which it is allowed to fall, drop by drop, by means of the stop-cock in the boiling alkali solution, and distillation is continued until all the ammonia is driven over. The distillate is collected in graduated glass cylinders after which it is treated with Nessler's reagent and the coloration produced matched with standard solution of ammonium chloride. The standard solution is made up of a strength equal to 0.03815 gram ammonium chloride per liter so that 1 c.c. is equivalent to 0.01 milligram of nitrogen. Extreme care should be taken that the water, hydrochloric acid, etc., used are perfectly free from nitrogen compounds.

Steels containing titanium are especially included because it is regarded as removing nitrogen and hindering the segregation of phosphorus, sulphur and carbon, thus decreasing brittleness and increasing toughness and ductility. In the heats referred to, the titanium was added to the steel in the ladle.

Inconsistency of Merit Ratings

By reference to Table 2 it can readily be seen how inconsistent merit systems are for determining the quality of a steel. The merits obtained from the physical properties indicate that sample 3 is the next to the best steel, while from Mr. Stromeyer's rule it is placed last in rank. Sample 5 is ranked last, judged by its physical properties, and is first when judged by its phosphorus and nitrogen contents. Only one sample stands high under both systems—sample 6. It is rather curious that sample 5, the average of the open-hearth heats, is the lowest in nitrogen, the physical tests being good for that grade of steel. These steels are from a basic open-hearth furnace and extreme care was exercised in their production, illustrating what proper handling will do. It is rather surprising that the sample representing the electric furnace steels—sample 1—should stand fourth by both merit systems and be only moderately low in nitrogen as compared with the others.

The author fails to consider one method of determining the comparative merit of steels—their elastic ratio. If the steels are arranged according to this criterion the results would be as shown in Table 3, in which the three merit qualities are collected.

Table 3

Sample	Elastic ratio, per cent.	Merit	Merit by T + E	Merit by P and N
1	64.4	4	4	5
2	59.3	5	5	3
3	66.1	2	2	6
4	64.6	3	3	4
5	56.4	6	6	1
6	66.4	1	1	2

It is seen that merit by elastic ratio or by the English method accords the same rank to each steel, whereas the third causes a wide difference in two cases, samples 3 and 5. Is it not probable that the chemical results are more likely to be misleading than the physical? How can a steel with such excellent physical results as sample 3 be ranked so much lower than one with relatively such poor results?

A patent has been granted to Albert E. Greene, Chicago, Ill., for producing manganese or other alloy steels by charging solid ferromanganese in a proper vessel on which is then poured enough molten soft steel of proper composition. The further melting and heating in a reducing atmosphere is accomplished by means of electricity.

The American Railway Association bulletin of May 31 shows that the net surplus of freight cars in the United States and Canada on that date was 50,908, as against 50,294 on May 15 and 39,799 on May 1.

The name of the National Iron & Steel Company, 1034 Pierce Building, St. Louis, has been changed to the National Steel-Rail Company.

MEYER & SONS,
 Mechanical and Civil Engineers,
 PITTSBURGH, PA.

Chairman Gary's Direct Examination Closed

(Continued from page 1437)

business affairs so far as our policies, principles and results are concerned." He added:

Our attitude has been that if at any time our policies, principles, position or methods of management did not meet with the full approval and agreement of the Administration or any other department or bureau of the Federal Government concerning each or all of our subsidiaries, we have always been willing to and did alter them to meet the feeling or overcome the criticism of the Government's departments. As a matter of fact, the first criticism I recall ever having heard by any branch of the Government was that made by members of the Stanley Committee. I can positively state that we never concealed from any Government bureau anything pertaining to the affairs of the Steel Corporation.

Efficiency and Welfare Work

The efficiency work done by the corporation in its various branches was taken up. Judge Gary told of the bad labor conditions existing at the Alabama plants of the Tennessee Coal, Iron & Railroad Company when it was taken over. He said:

I found some convict labor was being employed, and after ascertaining the facts and finding that the conditions were not proper, I gave instructions to abandon convict labor as soon as the contracts with the State expired. There is no convict labor employed there now and we have greatly improved conditions of labor as well as living there, and are also paying higher wages.

The welfare work for employees, he frankly admitted, was a good investment and business proposition to the corporation, because it raised the standard of service, increased production by greater efficiency, and it generally "paid us to do it." Negro labor, on the whole, he asserted, requires more careful attention than any other class.

Interlocking Directorates

Asked whether or not a director had been elected to the board of the Steel Corporation mainly because he was already on the directorates of other corporations over whom it was sought to obtain some influence by the practice, as charged by the Government, of "interlocking directorates," Judge Gary emphatically denied that this was true.

"On what basis were the directors of the corporation elected?" asked Mr. Lindabury.

"All of them were elected," responded Judge Gary, "because of their merit."

He was equally emphatic in denying, in response to the final question on direct examination, that the intent or effect of the Steel Corporation's formation, growth and general policies was to restrain trade or suppress competition.

Cross-examination was temporarily suspended to allow the testimony to be taken of Percival Roberts, Jr., who had announced his intention to sail for Europe soon.

Cross-Examination Begins

On Monday, June 9, the Government's attorneys began the cross-examination of Judge Gary. Throughout this portion of his testimony the increase of his power in the corporation from its inception down to the present time became apparent. It also was emphasized that Judge Gary inaugurated the policies that now prevail and that he is ready to take the responsibility for them. He showed by his testimony various ways by which he sought to stop price-cutting and how he made strong efforts to prevent subsidiaries of the corporation from waging destructive warfare on other steel concerns. When Judge Dickinson referred to Judge Gary's policies as "beneficent competition," the latter became grave and said that while he did not pose as a "philanthropist in business," he had checked many methods of which he did not approve.

Dissensions at the Beginning

Judge Gary threw additional light on the dissensions in the inner circle that marked the early days of the corporation. He had testified that his policy of treating competitors like "gentlemen" and not resorting to the methods of the Carnegie régime had not taken effect in the first

few years, and he said this explained entries in the minutes of various subsidiaries of those days which showed how they could cut prices and put their competitors out of business. William E. Corey and Charles M. Schwab, ex-presidents of the Steel Corporation, had told of their disagreements with Judge Gary, and Mr. Schwab referred to his own faith at that time in pools, which Judge Gary opposed.

Judge Dickinson asked which members of the executive committee stood with Judge Gary, its chairman, at the start of the Steel Corporation. In an embarrassed manner Judge Gary named them over and showed that those generally in opposition were Mr. Schwab, William Edenborn, E. C. Converse, and Daniel G. Reid. Percival Roberts, Jr., stood by him on all issues and Robert Bacon and Charles Steele of J. P. Morgan & Co. agreed with him, but their attendance at meetings was not regular.

Later on, after Judge Gary got hold of things, the executive committee was abolished and power was concentrated in the finance committee, with Judge Gary as chairman, and still later as chief executive officer. He said:

The selling policies of the Steel Corporation were not so carefully enforced on the subsidiaries in the first three or four years as they were afterward. In the early years some of the officials would talk of driving a man out of business. These things I always disapproved of.

The Corporation's Great Power When Formed

Judge Gary had testified that the Steel Corporation would not now be able to drive out a competitor without proportionate injury to itself, and Judge Dickinson wanted to know if it could have done so when the combination was formed. Judge Gary answered:

The Steel Corporation could have put some of them out of business at the start. I have no doubt we could. Not only could we have done so, but others could have done the same thing. I believe that at that time Jones & Laughlin, for instance, could have driven out the Republic Iron & Steel Company. Those conditions have changed.

From the minutes of the National Tube Company, of which E. C. Converse was president, were read expressions by William H. Latshaw, its second vice-president, in 1902, the year after the Steel Corporation was formed. Judge Gary was entirely unable to recall Mr. Latshaw, although the minutes showed that he was present at directors' meetings at which Mr. Latshaw declared himself. Judge Gary thought Mr. Latshaw must have left within a short time.

At one meeting Mr. Latshaw spoke of "the sales policy just inaugurated to meet the advances of our competitors," as "a notification of the intention of his company to dominate the trade situation." Judge Gary could not explain what policy was meant and could not recollect such a statement having been made. He explained that he was not so active in those days as he became later. At a later meeting Mr. Latshaw reported a considerable increase of sales, which were attributed to "the operation of the new selling plan, which was progressing satisfactorily in that the trade seemed satisfied and that it had temporarily defeated competition." Judge Gary commented on this as follows:

In the earlier years there were notions in the minds of our subordinates which led them to make statements in my presence as to what they would do or believe in doing, which, as I began to get into harness, I endeavored to correct and change. When any thing was suggested after that that did not seem to me to be fair and right and decent, I opposed it and the finance committee sustained me until we came to a point where we did not allow any of our people intentionally to do anything contrary to the policies I have testified to.

Secret Contracts by the Carnegie Company

Judge Dickinson asked about a series of contracts, which he characterized as secret and discriminatory, made by the Carnegie Steel Company with the Pressed Car Steel Company, the American Can Company, the National Transit, the Pittsburgh Steel Company, and others after the Steel Corporation was formed. Judge Gary did not know anything about these contracts. He said he was a "nominal" director in the Carnegie Steel Company, but did not go to Pittsburgh to attend the meetings.

The acquisition of the Union and Sharon properties, some time after the original combination, was taken up, and Judge Dickinson tried to show that they constituted

an "integrated, rounded-out proposition," such as Judge Gary said the Steel Corporation was organized to effect. The witness admitted that it was financially strong, with A. W. Mellon and H. C. Frick among the directors, that it had plenty of ore, and made not only unfinished steel but also finished products, but he did not consider it strong as a manufacturing organization.

No Pig Iron Bought to Sustain Its Price

Judge Dickinson tried to get him to admit that the Steel Corporation bought up pig iron in order to sustain the price. He quoted from the records of various meetings to show that former Vice-President Gayley, Mr. Corey and others had suggested that course. Judge Gary said he himself was opposed to such a thing and he denied it ever was done. He admitted that the corporation had bought pig iron for its own needs and he cited an incident where he insisted on paying only \$18 a ton, though several other directors wished to pay \$19 a ton in order to maintain the price.

Judge Gary admitted that he had given orders forbidding a certain thing and afterward learned his directions were not carried out. He said he had no idea that officers of the subsidiary companies in the early days of the corporation were talking as was shown by the records of their meetings. He said he had no idea that such minutes were being kept by the different companies. "I am glad, however," he said, "that you have them." He said that when he learned that at times his directions were not being carried out, or that certain officials thought they were doing the right thing for the corporation by not heeding him, he took extra measures to see that the policies of the corporation were put into effect.

The hearing was adjourned to Wednesday.

Chicago Foundrymen's Club

The Chicago Foundrymen's Club held its annual dinner Saturday, June 7, at the new Transit House, adjoining the International Amphitheater, in which the foundry exhibit of the Foundry & Machine Exhibition Company is to be held in October. The programme was informal in character, and, with the exception of the announcement of the appointments for the Chicago general committee in charge of arrangements for the American Foundrymen's Convention, was given to a continuous vaudeville and cabaret entertainment. As previously announced, Charles A. Plamondon has been chosen permanent chairman. The other members of the general committee are as follows: Treasurer, David R. Forgan, president National City Bank; secretary, H. Cole Estep, Iron Trade Review; chairman of finance committee, J. A. Galligan, Pickands, Brown & Co.; chairman of reception committee, William Francis, Francis & Nygren Foundry Company; chairman entertainment committee, James Wood, Sheffield Foundry Company; chairman publicity committee, O. J. Abell, *The Iron Age*.

Open Hearth Steel Plant at Kokomo, Ind.

The Kokomo Steel & Wire Company, Kokomo, Ind., has issued \$400,000 of first mortgage 6 per cent. bonds, dated May 1, 1913, for the purpose of building an open-hearth steel plant and blooming mill for the manufacture of the company's own billets. There will be two 75-ton furnaces and a 42-in. blooming mill with reversing engine. The company at present has two plants, the North plant having a capacity of 500,000 to 750,000 ft. of ornamental fence and 20,000 wire gates a year. At the South plant is a Garrett rod mill with a capacity of 300 to 350 tons of rods in 24 hours. The wire-drawing mill has a capacity of 300 tons a day. On the completion of the open-hearth steel mill the company's output will be 75,000 tons of finished products a year.

Wheat exports from this country have latterly been unusually heavy. Figures published by Bradstreet last week showed that in the current week 7,561,000 bushels of wheat had been exported and that this movement had been surpassed only twice in the history of our wheat export trade.

Philadelphia Foundrymen's Association

The closing meeting of the Philadelphia Foundrymen's Association, prior to the usual suspension for the summer months, was held at the Hotel Walton, in that city, on the evening of June 4. President Thomas Devlin, in opening the meeting, made an address on the death of Dr. Elmer E. Brown, vice-president of the association. He paid a high tribute to his deceased friend and associate, in the course of which he said:

"The soldier's orphan boy left the imprint of his strong personality on every position he filled, whether as a farmer, manufacturer, director of a financial institution, officer of the Philadelphia Foundrymen's Association or vice-president of a great institution for the education of the rising generation—I mean the Temple University."

Secretary Howard Evans and others followed with brief addresses on the same subject. The secretary announced also that at a special meeting of the association, held at the Manufacturers' Club, May 26, to take action on the death of Dr. Brown, a committee consisting of A. A. Miller, Howard Evans and W. T. Hallowell had been appointed to prepare memorial resolutions. As a mark of respect to the late vice-president of the association, it was resolved that the office be declared vacant for the remainder of the association year.

E. W. Riker, representing the McCall & Clarke Company, specialist in business economics, made an address on "Accurate Cost Control for the Foundry by Economic Methods." Mr. Riker treated the subject of cost accounting from various angles, covering the manufacturing, selling and office departments. Following the address, the application of a satisfactory cost system to general foundry work was discussed in connection with which Mr. Riker said that no hard and fast rule could be applied but that each condition must be considered on its own merits.

Following adjournment refreshments were served. The next regular meeting of the association will be held on Wednesday, September 3, at the Hotel Walton.

Pittsburgh Foundrymen's Association

The annual meeting of the Pittsburgh Foundrymen's Association was held in Pittsburgh, Pa., on Monday evening, June 9, and took the form of a smoker. Officers were elected as follows: H. W. Petty, American Steel Foundries, president; H. J. Koch, Fort Pitt Steel Casting Company, vice-president; W. J. Brant, W. J. Brant Company, treasurer; F. H. Zimmers, Union Foundry & Machine Company, secretary. An executive committee was also elected, consisting of W. A. Bole, Westinghouse Machine Company; J. L. Uehler, Union Steel Casting Company; Thomas Ward, Pittsburgh Brass Mfg. Company; T. E. Malone, J. S. McCormick Company; R. H. Hood, Gulick-Henderson Company. The meeting was addressed by Dr. J. Leonard Levy, after which a luncheon was served.

The treasurer reported balance on hand June 1, 1913, of \$810.87; receipts during the year \$821; interest on balance in bank \$11.24, or a total of \$1643.11, while disbursements were \$717.87, leaving a balance on hand June 1, 1913, of \$925.24. The treasurer also reported that the trustees' fund had increased from \$2,983.60 on June 1, 1912, to \$3,166.22 on June 1, 1913. The secretary reported that the association had 157 members on June 1, 1912, and 135 on June 1, 1913, a loss of 22 members during the year. Short addresses were made by Past Presidents Bole, Gale, Sleeth, Speer, Spilker and Yagle, after which a luncheon was served. It was decided to suspend the monthly meetings during July and August, and the next meeting will be held on Monday evening, September 9.

The Pennsylvania Railroad authorities have analyzed all accidents occurring on its lines in 1912, and the conclusion is arrived at that probably 70 per cent. of those accidents could have been prevented if employees had exercised special caution. The study covered every kind of accident taking place on railroad property from a woman tripping on station steps to the derailment of a train. A book has been compiled entitled "Safety Hints and Suggestions for the Prevention of Personal Injury Accidents" which will be put in the hands of all officers and employees.

Mechanical Engineers Sail for Germany

Departure of Party of American Society
for Joint Meeting with German Society

The so-called official party of the American Society of Mechanical Engineers, which is to attend a meeting with the Verein Deutscher Ingenieure in Leipzig, June 22, 23 and 24, set sail on Tuesday morning on the Victoria Luise of the Hamburg-American Line from Hoboken, N. J. At this writing, there appears to be about 250 all told, of whom about 40 per cent. are ladies, but they are to be joined in Germany by 45 others now abroad or sailing by other routes. The meeting promises to be one of unusual importance in that a three weeks' tour of Germany has been arranged by the German society, taking the members chiefly to industrial centers, where opportunities are to be given for inspection of different manufacturing plants. In fact, the impression is that industrial Germany is to open its doors to the American visitors to an extent that has not heretofore been usual. The German society is the host of the occasion and has arranged for an almost unending succession of banquets, receptions, concerts and excursions of general as well as technical interest. For the convenience of the visitors, a special corridor train has been set aside for the use of the party throughout its stay in Germany. The German society has also prepared a guide book, in German and English, containing, besides the itinerary details, an account of the German society and the profession in general in that country, as well as of the cities and establishments to be visited. The larger cities included in the tour are Hamburg, Leipzig, Dresden, Düsseldorf, Cologne, Coblenz, Rudesheim, Frankfurt-am-Main, Mannheim, Heidelberg and Munich. On some days there are as many as five or six separate plant visitations scheduled, not more than one of which can the individual undertake. For the trip across the Atlantic committees have been appointed to take care of the social affairs.

The official party sailing on the Victoria Luise is as follows, the names prefixed with the asterisk indicating that members of the family are participating:

- *Alden, H. W., chief engineer, Timken Detroit Axle Company, Detroit.
- *Aldrich, John G., vice-president and general manager, New England Butt Company, Providence.
- *Alford, L. P., editor, American Machinist.
- Barton, Wm. H., Ash Grove, Mo.
- Bates, Francis E., New York.
- Benner, Henry L., engineer, Hess-Bright Mfg. Company, Philadelphia.
- *Bennett, C. W., assistant to president, American Sheet & Tin Plate Company, Pittsburgh.
- Best, J. H., Quincy, Ill.
- Best, W. N., New York.
- *Binley, William, Jr., Summit, N. J.
- *Blood, Charles W. H., vice-president, S. A. Woods Machine Company, South Boston.
- Bond, George M., Hartford, Conn.
- Boyer, Joseph, Detroit.
- *Bray, T. J., president, Republic Iron & Steel Company, Youngstown, Ohio.
- *Breckenridge, L. P., Sheffield Scientific School, Yale University, New Haven.
- Briggs, Leroy E., Edison Laboratories, Orange, N. J.
- *Brill, George M., Chicago, Ill.
- Brinton, Willard C., mechanical engineer, Bush Terminal Company, Brooklyn.
- *Brooks, J. Ansel, associate professor of mechanics, Brown University, Providence.
- *Brown, Robert S., secretary, New Britain Machine Company, New Britain, Conn.
- Brown, Wylie, Bridgeport Brass Company, Bridgeport, Conn.
- Bruegel, A. T., secretary, Hess-Bright Mfg. Company, Philadelphia.
- *Bunnell, S. H., chief engineer, Griscom Russell Company, New York.
- *Burleigh, P. Gray, Oswego, N. Y.
- *Bursley, J. A., University of Michigan, Ann Arbor, Mich.
- *Buttolph, Benj. G., vice-president, Manufacturers' Mutual Fire Insurance Company, Providence.
- *Carew, Clement J., vice-president, Venango Mfg. Company, Franklin, Pa.
- Carpenter, Russell H., Madison, Wis.
- Carr, C. A., Detroit, Mich.
- *Chapman, Frank T., Vento Department, American Radiator Company, New York.
- Christie, A. G., University of Wisconsin, Madison, Wis.

- *Clarke, C. W. E., Stone & Webster Engineering Corporation, Boston.
- Clifford, H. E., Annapolis, Md.
- Coleman, R. J., Philadelphia.
- Colwell, A. W., Chicago.
- *Connon, George W., Honolulu Iron Works Company, New York.
- Conroy, Ramon A., New Haven, Conn.
- *Cooke, Harte, mechanical engineer, McIntosh & Seymour Company, Auburn, N. Y.
- Dart, William C., president, Rhode Island Tool Company, Providence.
- Davis, Francis P., Providence.
- *DeBaufre, Wm. L., United States Engineering Experiment Station, Annapolis, Md.
- *Detrick, Jacob S., president, Detrick & Harvey Machine Company, Baltimore.
- Dickerman, A. C., mechanical engineer, Rhode Island Supply & Engineering Company, Providence.
- Disque, Robert C., Madison, Wis.
- *Doble, William A., chief engineer, Pelton Water Wheel Company, San Francisco.
- Dotterweich, A. J., Wilkesburg, Pa.
- Felker, Geo. F., New York.
- *Fellows, E. R., manager, Fellows Gear Shaper Company, Springfield, Vt.
- Fischer, Ad. K., president, Schutte & Koerting Company, Philadelphia.
- Fitch, William K., Madison, Wis.
- Ford, F. E., Hoboken, N. J.
- *Folsom, Eugene L., Waltham, Mass.
- *Foucar, E. L., San Francisco.
- *Freeman, John R., Providence.
- *French, L. G., editor, American Society of Mechanical Engineers, New York.
- Frost, George H., Plainfield, N. J.
- *Fuller, Arthur A., Providence.
- *Gantt, H. L., New York.
- Gates, Philetus W., president, Hanna Engineering Works, Chicago.
- *Gilbreth, Frank B., Providence.
- *Goldingham, A. H., New York.
- *Goss, Chauncey P., Jr., Waterbury, Conn.
- Graefe, A., New York.
- *Greene, Arthur M., Jr., Rensselaer Polytechnic Institute, Troy, N. Y.
- *Guilbert, H. Moss, New Haven, Conn.
- Haight, H. V., chief engineer, Canadian Ingersoll-Rand Company, Sherbrooke, Que.
- Hall, James A., Brown University, Providence.
- Harder, Lewis F., New Haven.
- *Hartness, James, president, Jones & Lamson Machine Company, Springfield, Vt.
- Hersey, Mayo D., assistant physicist, United States Bureau of Standards, Washington.
- *Hess, Henry, Philadelphia.
- *Hess, H. D., professor machine design, Cornell University, Ithaca, N. Y.
- Honsberg, August A., Cleveland, Ohio.
- *Horstmann, H. J., Mechanical Engineer, F. W. Horstmann Company, Newark, N. J.
- Jackson, A. C., general superintendent, secretary and treasurer, Miller Lock Company, Philadelphia.
- *Kaup, W. J., Westinghouse Electric & Mfg. Company, Pittsburgh.
- *Keller, E. E., president, Detroit Insulated Wire Company, Detroit.
- Kent, Edward R., Providence.
- Kent, Robert T., editor, Industrial Engineering Company, New York.
- Kent, William, New York.
- King, L. S., Oakland, Cal.
- Klein, Arthur W., Lehigh University, Bethlehem, Pa.
- Klein, Otto H., New York.
- *Knowles, Morris, Pittsburgh.
- Kornfeld, Alfred E., New York.
- LeBlond, R. K., president, LeBlond Machine Tool Company, Cincinnati.
- *Leland, H. M., general manager, Cadillac Motor Car Company, Detroit.
- Lodge, William, president, Lodge & Shipley Machine Tool Company, Cincinnati.
- *Low, Fred R., editor, Power, New York.
- Lucas, Henry M., Lucas Machine Tool Company, Cleveland.
- Macon, W. W., *The Iron Age*.
- *Marshall, Norman, West Newton, Mass.
- Mead, Charles A., Upper Montclair, N. J.
- *Meier, E. D., president, Heine Safety Boiler Company, New York.
- *Merriman, Mansfield, New York.
- Merryweather, George E., president, Motch & Merryweather Machine Co., Cleveland.
- *Miller, T. H., superintendent, DeLaval Separator Company, Poughkeepsie, N. Y.

Moore, L. C., Lee C. Moore & Co., Pittsburgh.
 *Moore, Samuel L., vice-president, Moore Brothers Company, Elizabeth, N. J.
 *Morse, Arthur H., mechanical engineer, Baldwin Company, Cincinnati.
 Morse, Virgil, Pasadena, Cal.
 Nelson, J. W., manager, Estate of Richard Dudgeon, New York.
 *Nickel, Frank F., engineer, Henry R. Worthington, Harrison, N. J.
 *Palmer, George B., Detroit.
 Felton, E. W., New Britain, Conn.
 Person, Harlow S., Hanover, N. H.
 Pinger, George C., engineer, West. Conduit Company, Youngstown, Ohio.
 Price, W. T., De La Vergne Machine Company, Philadelphia.
 *Reist, H. G., mechanical engineer, General Electric Company, Schenectady, N. Y.
 Rice, Calvin W., secretary, American Society of Mechanical Engineers, New York.
 Richards, Charles R., director, Cooper Union, New York.
 Richmond, Knight C., Providence.
 *Riley, Joseph C., Massachusetts Institute of Technology, Boston.
 *Risteen, A. D., Hartford, Conn.
 Roe, Joseph W., assistant professor, Sheffield Scientific School, Yale University, New Haven, Conn.
 Sadler, C. R., Bayonne, N. J.
 *Sanders, Newell, Newell Sanders Plow Company, Chattanooga, Tenn.
 Schmidt, C. R., Baltimore, Md.
 *Schmidt, F. L., New York.
 Schmitt, F. L., New York.
 Schnuck, Edward F., Jabez Burnz & Sons, New York.
 Deschweinitz, P. B., professor machine design, Lehigh University, Bethlehem, Pa.
 Seligman, Walter, New Haven, Conn.
 Seubert, Arthur, St. Louis, Mo.
 Sherrerd, J. M., Easton, Pa.
 Sherrerd, S. H., Felton, Oriente, Cuba.
 Skinner, A. C., Sherbrooke, Que.
 *Smith, Jesse M., New York.
 *Snyder, W. E., mechanical engineer, American Steel & Wire Company, Pittsburgh.
 *Soverhill, H. A., vice-president, Root & Van Dervoort Engineering Company, Moline, Ill.
 Staples, R. T., New York.
 *Stebbins, Theodore, New York.
 Stetson, George R., president, board of directors, New Bedford Gas & Edison Light Company, New Bedford, Mass.
 Thompson, Hugh L., Waterbury, Conn.
 *Thorkelson, H. J., University of Wisconsin, Madison, Wis.
 *Thurston, Edw. D., Jr., Columbia University, New York.
 *DeTrampe, Adam, Philadelphia.
 Trix, John, Detroit.
 *Troeger, John F. R., New York.
 *Warner, Worcester R., Warner & Swasey, Cleveland.
 *Webster, L. B., Marion, Ind.
 *Wellman, S. Knowlton, Cleveland.
 Wheeler, W. H., New Brunswick, N. J.
 *Whitlock, E. H., factory manager, National Carbon Company, Cleveland.
 *Wilke, H. P., Buffalo, N. Y.
 Wilkin, John T., vice-president, Connersville Blower Company, Connersville, Ind.
 Wood, Walter, R. D. Wood & Co., Philadelphia.
 Young, G. A., head of department of mechanical engineering, Purdue University, Lafayette, Ind.

Among those who are to join the party in Europe are the following:

*Adamson, Daniel, Jos. Adamson & Co., Hyde, Cheshire, England.
 Alexander, M. W., General Electric Company, Lynn, Mass.
 *Bates, E. P., Syracuse, N. Y.
 Bolles, F. G., Milwaukee, Wis.
 *Cole, F. J., chief consulting engineer, American Locomotive Company, Schenectady, N. Y.
 *Davis, Charles Ethan, general manager, American Locomotive Company, Providence.
 *Dean, F. W., Boston.
 *Kretschmer, F. G., Frankfurt-on-Main, Germany.
 *London, W. J. A., Terry Steam Turbine Co., Hartford, Conn.
 *Marks, L. S., professor, mechanical engineering, Harvard University, Cambridge, Mass.
 Morgan, L. H., Whitewell, Cheshire, England.
 Morse, Lewis K., Boston.
 Robeson, A. M., St. Aubin, Jersey, Channel Islands.
 *Schlachter, C. H., Botany Worsted Mills, Passaic, N. J.
 Shearer, C. A., engineer, Nationale Radiator Gesellschaft, Schönebeck-Elbe, Germany.
 *Simon, Arthur, Cutler-Hammer Mfg. Company, Milwaukee.
 *Snow, Walter B., Boston.
 *Sunstrom, K. J., Stockholm, Sweden.

*Taylor, J. W., Essex, England.
 *Thompson, David, Castlemaine, Victoria, Australia.
 *Whiteford, James F., London, England.
 Wilke, William, Buffalo.

Briquetted Ore in Blast Furnaces

At a recent meeting of the Verein Deutscher Eisenhuettenleute at Duesseldorf, May 4, Professor Mathesius, of the Royal Technical School of Charlottenburg, in discussing concentration and briquetting of iron ores, gave some information covering the operation of blast furnaces, and the saving which may be obtained by proper preparation of the ores making up the furnace burden. He referred to experiments he had made, over a period of two years, as to the reducibility of different kinds of sintered, agglomerated and briquetted products, at temperatures varying from 600 to 900 deg. C., all in an atmosphere of illuminating gas. He stated that the tests showed a reducibility for briquettes obtained by compression mainly which was much superior to the reducibility of agglomerated or sintered material, even exceeding in certain cases the reducibility of lump ores. Chemiker Zeitung, in referring to the discussion, says: Judging from the excellent results obtained of late in the use of briquettes in blast furnace operations in Sweden and Germany, it is fair to assume that if the large amount of fine ores which are now being used, was briquetted, it would be of great benefit to numerous blast furnace plants. Notable is the considerable saving in coke which is obtained, as much as 15 per cent. or more, as well as an increase in the output of metal, which may double in the case of slow-driving furnaces; a decrease in the wind pressure also, and, due to the increased output, a decreased volume of air per ton of metal.

Lake Iron Ore Shipments in May

The amount of iron ore brought down the Lakes from the Lake Superior region in May amounted to 7,284,210 gross tons as compared with only 5,919,074 tons in May, 1912. The table below gives the May and season shipments by ports and the corresponding figures for 1912, all in gross tons:

	May, 1913	May, 1912	To June 1, 1913	To June 1, 1912
Escanaba	738,158	712,359	955,187	792,889
Marquette	489,547	356,914	527,041	356,914
Ashland	681,460	513,484	734,941	521,772
Superior	2,047,394	1,931,307	2,300,271	1,995,723
Duluth	1,939,848	1,276,027	2,100,220	1,294,264
Two Harbors	1,327,803	1,128,983	1,532,939	1,161,554
Total	7,284,210	5,919,074	8,150,599	6,123,116
1913 increase		1,365,136		2,027,483

The increase for May is a remarkable one. It is the first time that the 7,000,000 mark has ever been passed in that month. The Duluth percentage to June 1 was 25.77 this year, against 21.14 last year, while the Great Northern dock at Superior shipped but 27.52 per cent of the total against 32.24 per cent. to June 1, 1912.

The Northwestern Barb Wire Company, Sterling, Ill., announces the purchase of the Griswold Company's entire plant in the same city. This plant has not been in operation for about a year, but it is the intention of the Northwestern Company to put the entire works into operation immediately, manufacturing a complete line of barb wire, staples, steel wire nails, field fence and annealed, bright and galvanized market and telephone wire; also the widely known Griswold bale tie. The Griswold Company was the pioneer in the manufacture of steel hay bale ties. It has manufactured bale ties for almost a half century. This department will be started at once, and will be run to maximum capacity.

The autumn meeting of the Iron and Steel Institute (British) will be held in Brussels, Belgium, September 1 to 4, 1913. The excursions include a visit to the International Exhibition at Ghent. There will also be visits to the works of John Cockerill & Co., Seraing, those of the Ougrée-Marihaye Company, and the Coppée coke oven gas plant at Athus-Grivegnée. An excursion to Charleroi will include visits to various metallurgical and glass works.

Safety Talks in Pay Envelopes

Accident Insurance for Employees Also Provided by Kilbourne & Jacobs Mfg. Company

One of the latest ideas in what has sometimes been called welfare work is a plan of insurance now being tried out by the Kilbourne & Jacobs Mfg. Company, Columbus, Ohio. The scheme is that all of the employees are properly protected against accidents during the full 24 hr. of each day. This is accomplished by insuring them under a blanket policy of an accident insurance company for one-half of the workman's weekly wage. When a man punches the time clock in the morning he knows that he is insured for the ensuing 24 hr. The company pays the premiums and collects and disburses to the injured employee all indemnities due. No charge is made the workman for the cost of the premium, nor is he asked to sign any release papers for an injury sustained in the factory or outside. If the workman's injury keeps him incapacitated for a period of 52 weeks, one-half his weekly earnings is paid to him for that period, with the exception of the first week's payment, for which there is no indemnity allowed.

Coincidentally with the establishing of the insurance idea explained above, the company has inaugurated a special campaign, designed to reduce accidents in its factory to the lowest possible minimum. All exposed, dangerous parts of machines are covered, as far as possible, and the usual red ball danger sign is posted at all points indicating that caution should be observed.

Each foreman and superintendent is constantly requested by Charles H. Doty, manager of construction and inspection departments, to remind their men frequently that it is dangerous to grow careless.

To instill caution further, the pay envelopes each week contain a colored slip, asking for the co-operation of all employees in the prevention of accidents. Some of these are as follows:

BE A BOOSTER

For Prevention of Accidents and Injuries

Let every employee make himself a committee of one to prevent some one accident. The failure to obey safety rules endangers the life of yourself or fellow workmen.

SAFETY

It pays to think before you act.

Try to avoid accidents; this means YOU.

One man's efforts toward safety may seem small, but all together can do a great deal. Every effort in this direction helps.

Be sure that everything is safe, then go ahead.

Look out for the other man, you might hurt him.

Help to prevent accidents.

WATCH FOR THE ROUND RED SPOT! IT MEANS DANGER.

SAFETY CO-OPERATION

After all is said and done, the most important factor in accident prevention is the right spirit. Without co-operation between foremen and workmen, there can be no effective campaign for safety.

Do not fail to notice all danger signs, and if possible, see that no one disregards them.

ALWAYS BE ON THE LOOKOUT FOR THE ROUND RED SPOT. IT IS THE UNIVERSAL DANGER SIGNAL.

AVOID ACCIDENTS

Look to Your Tools

Every employee, whose duty requires him to work with appliances of any kind, should carefully examine same and report any defects to his foreman before using them.

To be careless, thoughtless or reckless means injury sooner or later to yourself or others.

We will welcome suggestions from employees on anything of a dangerous nature.

ALWAYS LOOK OUT FOR THE ROUND RED SPOT.

One rule that is rigidly enforced is that when a man is slightly injured and suffers an open wound liable to infection, he is required to go immediately to the company's hospital and have the injury properly dressed, no matter how small it may be.

New Tools and Appliances

This is essentially a news department for which information is invited.

Universal Ball Vise.—Adolph Muehlmann, Cincinnati, Ohio, is manufacturing a ball vise of the universal type that is intended for use by the tool maker, die sinker, stamp cutter and mold maker. The vise has a capacity up to 4 in. between the jaws, which are operated by a ½-in. right and left hand screw. The jaws are mounted on a turntable, revolving on ball bearings that can be removed and the turntable locked to the base, if desired. The device can be rolled or tilted to any desired angle, and the turntable with the jaws revolved to bring the work into the most convenient position for the user. Cast iron is used for the turntable and the base and the pilot of the turntable runs in a phosphor-bronze bushing. The jaws are drilled at the top to receive special jaws of any kind, and in addition, pins are supplied to enable the work to be held on top of the jaws instead of between them, together with extension holders for gripping large pieces. The jaw depth is 1½ in. and the vise is 5½ in. in diameter and weighs 20 lb.

Wire Spoke Swaging Machine.—A machine for swaging the spokes of wire wheels for automobiles has been designed and built by the Langelier Mfg. Company, Providence, R. I. This machine takes the wire from the coil, straightens it and swages the spokes between butts and mechanically cuts them off to length after the swaging operation has been performed, the work being entirely automatic. The output of the machine is as high as 3 spokes per min., a finished spoke being cut off while the next one is being swaged. The coil of wire is supported on a reel resting on the floor, from which it unwinds as it is drawn through the straightener on its way to the swaging machine. The straightener is of the improved rotary type, having offset steel eyelets mounted with ball bearings, so that the eyelets do not bear in an unyielding manner against the passing wire, but revolve, so that the finish of the wire is not marred. The wire enters the special swaging machine, and the outward travel of the saddle draws the wire through, the automatic operation of the wire gripping chuck carried by the saddle being secured through the action of a wedge, which is actuated by the saddle as it reaches the extreme points of its travel. The machine occupies a floor space of approximately 3 x 6 ft. and weighs about 5500 lb.

Hight Gauge.—An attachment for a combination square, which enables this type of tool to be used as a hight gauge, has been recently placed on the market by the Alvan Mfg. Company, 306 Fourteenth avenue, Newark, N. J. A hardened or ground jaw or blade is secured to the scale of the combination square, by an eccentrically located interlocking stud that is carried by a semi-circular saddle piece. For adjusting the blade to any desired position, the stud is partially loosened, which gives a steady movement and enables the attachment to be brought without delay to the desired position. In addition to being used as a hight gauge, the use of a pair of these attachments on the blade of a combination square gives a beam caliper. Compensation for any variation in the width of the blade of the square on which the attachment is used is provided.

Grinding Machine for Formed Cutters.—The Union Twist Drill Company, Athol, Mass., has recently placed on the market a machine designed for grinding formed cutters radially, so that the cutter runs true and the proper share of work is done by each tooth. In operation, the cutter to be ground is mounted on a vertical arbor adjacent to the grinding wheel. An indicator is provided which comes in contact with the relieved face of the tooth, and when a tooth has been ground, the reading of this indicator is noted. The work is then rotated to bring the next tooth into position for grinding, the cutter being adjusted to obtain a corresponding indicator reading. Longitudinal and transverse travel of the grinding wheel is secured by two thumb wheels. The thumb wheel for operating the transverse movement is used for bringing the wheel up to the work after it has been indexed and the longitudinal one is employed for truing up the wheel, a diamond being mounted inside the wheel guard in line with the axis of the arbor upon which the work is mounted.

The Machinery Markets

Most manufacturers continue busy with orders in hand which, of course, are being augmented by current demand, but indications of slowing up in buying are apparent in all directions. It is believed, however, that the new business, though diminished in volume, with the momentum gathered in recent months, will carry the trade along for at least some weeks to come. Both orders and prospects have caused a little better feeling in the New York market, but comments on the falling off of new business are often heard. In Philadelphia trade was fair in May, but now shows a quieter tendency. Conditions are irregular in New England, but nearly all plants are active to a normal extent, despite strike troubles in scattered districts and curtailment in the textile industry. The demand for machine tools in Cleveland has been moderate, with orders scattered and a little better call for second-hand machines than for new. Orders in hand are keeping the trade busy in Cincinnati, where railroads are deemed the best prospects. In Detroit, where some labor trouble is reported, there has been only a fair lot of orders, but some good power plant business is in prospect. Small orders have continued steady in Milwaukee, where some of the metal trades have raised wages to avert further labor troubles.

Power equipment is moving well in the Central South, as are some other lines, while others have slackened up considerably. Hydroelectric and mine developments are active in the Birmingham territory, and the call there for steam power equipment is good, but machine tools are moving slowly. The aggregate of trade is pronounced fairly good in St. Louis, with a notable demand for second-hand tools. The tendency to delay in buying is felt on the Pacific coast, although the demand for general contracting equipment is fairly good. In Texas, public utility installations are making business. Conditions in Mexico show no improvement and little or no effort is being made to get trade from that country.

New York

NEW YORK, June 11, 1913.

The placing of a few fairly good orders in the last week gave a better aspect to the local trade situation, but the improved feeling is not well distributed and the bulk of the trade continues to remark the falling off in new business. Most of the orders received are the culmination of inquiries of several weeks' or months' standing. The Norfolk & Western Railroad has started to close against its long pending list of requirements and there has been some fair scattered buying as well. One dealer, for instance, made a sale of sixteen four-spindle drilling machines and five one-spindle machines. The Crown Cork & Seal Company, Baltimore, Md., was the purchaser of a few small turret lathes. A large industrial company in northwestern New Jersey will buy in the near future machine tools to the value of several thousand dollars. Not only are manufacturers of hydraulic machinery busy, but they report unusually active inquiry. Collections by the trade generally are a trifle slow. In some cases salesmen find they are getting as many orders as heretofore, but that quantities are being cut down. It is understood that the Delaware, Lackawanna & Western Railroad will not take final action on its list until after the close of the conventions of the American Railway Master Mechanics' Association, June 11-13, and the Master Car Builders' Association, June 16-18, at Atlantic City, N. J. The New York machinery trades will be well represented at these conventions in connection with the exhibit of machine tools and appliances usual at these annual gatherings.

The plant of the Columbia Paper Bag Company, the American Druggist Syndicate and Pratt & Lambert, varnish manufacturers, Long Island City, N. Y., were damaged by fire on June 8. Exact information as to the damage sustained and the plans for rebuilding is not available at the present time.

The Atha Tool Company, Newark, N. J., is enlarging its plant by the erection of new buildings. These are of concrete construction and when completed will be equipped with the most modern appliances for plant efficiency and comfort of operatives.

The property of the Trenton Engine Company, Trenton, N. J., now in bankruptcy, will be sold at auction June 24, at 10 a. m., on the premises, Parker and Randolph avenues, Trenton. The real estate consists of three tracts or parcels and will be sold with the improvements thereon, machine tools and shop equipment of various kinds, engines and parts of engines, patents, drawings, etc. Further information can be had from Clifton Reeves, trustee, Trenton, N. J.

The Syracuse Lighting Company, Syracuse, N. Y., will expend \$100,000 in improving its Fulton street station in order to insure maximum service in case of temporary failure of the Niagara current.

The Niagara Canning Company, Lockport, N. Y., recently organized by E. P. Marvin, Jr., and Frank

P. Silvernail of that city, will erect and equip a one-story factory of steel and concrete on lower Market street, East Lockport.

Bids for the construction of Barge Canal terminal No. 25 at Port Henry, N. Y., are soon to be taken by Duncan W. Peck, state superintendent of public works, Albany.

The contract has been awarded by the Blood Knitting Mills, Amsterdam, N. Y., for a two-story addition to its plant for use as a picker room.

The new cop yarn plant of the Chalmers Knitting Company at Amsterdam, N. Y., will soon be completed and in readiness for the installation of machinery, which will be electrically operated. The plant will comprise a knitting mill, 50 x 300 ft., four stories and basement; a one-story dye house, 58 x 110 ft.; a one-story boiler and pump house, 28 x 60 ft.; warehouse, 60 x 70 ft., four stories and basement, and two-story office building, 40 x 65 ft.

The Clark-Banks Foundry Company, recently organized at Buffalo by S. L. Clark and M. A. and G. I. Banks, is building and equipping a foundry at Niagara and Sloan streets for the manufacture of small gray iron castings and special work.

The Standard Automatic Machine Company, Rochester, N. Y., has increased its capital stock to \$150,000 from the former amount of \$50,000. Arthur H. Ingle is president of the company and Albert T. Bradley secretary.

The Dobel Mfg. & Plating Company, Buffalo, has been incorporated by N. J. and M. J. Dobel and J. W. Kirkpatrick, and will equip a plant with plating and polishing equipment.

The J. H. Williams Company, Brooklyn, N. Y., has let contract for the first building of its new plant at Buffalo on a 90-acre site at O'Neil street and Kenmore avenue at the northerly city line. Construction work on the plant will proceed during the summer.

The plant of the Wheatland Plaster Company, Wheatland, N. Y., was destroyed by fire June 7, with a loss of \$25,000 on buildings and machinery. It is stated the plant is to be rebuilt at once.

Governor Sulzer has approved the appropriations made by the New York State Legislature for the following:

Reformatory for Women, Bedford; boilers and piping, \$50,000; water supply, \$10,000; boiler plant and heating plant, \$20,000. Training School for Girls, Hudson; boilers, fittings and equipment, \$8,000. Custodial Asylum for Feeble Minded Women, Newark; two boilers, \$7,000; extending canal pump intake and rearranging canal pump, \$4,000. House of Refuge, Randall's Island; three new boilers and installation, \$5,000. Craig Colony for Epileptics, Sonoma; improving water supply and placing new filtering material in the sewage disposal plant, \$25,000; central power and heating plant, including distributing systems, \$50,000. Training School for Boys, Yorktown Heights; additional water supply, \$5,000. Buffalo State Hospital; water softening apparatus, \$7,000. Binghamton State Hospital; new building for chronic patients, \$225,000. Central Islip State Hospital; four boilers for the power plant, \$15,000; refrigerating and ice-making plant, \$54,500; extensions to laundry and equipment, \$20,000. Gowanda State Homeopathic Hospital; additional boiler capacity, \$11,000. Hudson River State Hospital; coal handling apparatus,

\$4000. Kings Park State Hospital: elevators for new building, \$12,200; for remodeling heating plant, \$50,000. Long Island State Hospital: power house, with equipment and conduits, \$125,000. Manhattan State Hospital: elevator for chronic building, \$2500. Rochester State Hospital: reconstructing sewage pumping station, \$5000. St. Lawrence State Hospital: additional boiler capacity, \$20,000; water softening apparatus, \$7000.

New England

BOSTON, MASS., June 10, 1913.

With the metal working machinery builders reports of increasing and decreasing business seem to come with alternating frequency. A house that had a dull fortnight in the latter part of May has experienced a marked period of good business since June opened. Another company is finding current orders decreasing. And so it goes through the trade. The demand is unsteady, but it is sufficient to keep works running up to normal. The textile machinery industry has held up bravely until lately. Some curtailment in production is in progress, though not to the extent which might be expected if the new tariff is to work the harm in the textile industry which has been prophesied.

The experiences of the machinery and supply dealers appears to be somewhat varied, probably because of the lines which they serve in specialties. Proposed increases in industrial capacity in the New England territory are not so great as they have been in some prosperous periods, yet the total is by no means discouraging. The condition of the money market is doubtless a hindering influence.

Labor troubles in New England, while confined to widely distributed localities, are more important in their character than they were a fortnight ago. The boiler makers are causing some trouble, chiefly in the shipyards of Boston. The most sensational strike is that at Hyde Park, Mass., where the machinists in the plants of the B. F. Sturtevant Company and the Becker Milling Machine Company are out. The ownership of both is controlled by Gov. Eugene N. Foss of Massachusetts, and politics are probably involved in the cause of the trouble. The union demanded a nine-hour day, with Saturday half-holiday, an advance in hourly rate of 20 per cent., with a minimum wage of 30c. an hour, and a general recognition of the union. The owners flatly refused to accede to such terms. The strike commenced May 29 and is confined to the machine shops, the foundries not being affected. Each company has a generous nucleus of its force of machinists at work and the number is being augmented. The works are picketed by the strikers.

Forbes & Myers, Union street, Worcester, Mass., have established a machine shop for the manufacture of electric motors, motor-driven grinding machines and other specialties. The firm is already putting on the market the beginning of a line of grinding machines for use in machine shops, foundries and blacksmith shops, and for other medium and heavy grinding. The drive is from the simplest type of induction motor; there are no brushes or moving contacts. The rotor runs in ball bearings, protected from dust and grit by double grooved covers. A tool grinding machine of the bench type has stout wheel guards. An open machine is arranged for bolting to a table or to post or wall. Each machine has two grinding wheels. Buffing and polishing machines constitute another specialty, and a grinding attachment for engine lathes, to be mounted on the carriage, is being brought out.

The P. B. Clarke foundry, Rumford, Me., was destroyed by fire June 5, with a loss of about \$13,000. It is stated that the work of rebuilding will begin immediately.

The Whitney Mfg. Company, Hartford, Conn., manufacturer of transmission chains and machinery, will erect a four-story addition to its works.

The Berlin Mills Company, Berlin, N. H., will rebuild its saw mill and wood repairing plant in that town, which was recently burned with a loss of \$750,000. The buildings will be of cement construction and fireproof throughout.

The reorganized Putnam Foundry & Machine Company, Putnam, Conn., manufacturer of heating apparatus, has elected Edward Mullan, Putnam, president; George M. Sampson, Woodstock, Conn., vice-president, and G. Harold Gilpatrick, Putnam, secretary and treasurer.

The Easton & Burnham Mfg. Company, Pawtucket, R. I., manufacturer of textile machinery, is about to erect new shops in that city, to replace works which have to be vacated because of the change in roadbed of the New York, New Haven & Hartford Railroad, in

eliminating grade crossings. The largest of these buildings will be 76 x 300 ft.

Additions to general manufacturing facilities of New England include the following: Kibbe Bros, Springfield, Mass., addition 56 x 77 ft., six stories, with ell 28 x 50 ft.; Frank H. Page, Springfield, Mass., factory 60 x 90 ft., three stories; Daniel E. O'Brien and Leonora F. Gorman, Salem, Mass., leather factory; Otter River Board Company, Otter River, Mass., plant to replace that recently burned; Worcester Gas Light Company, Worcester, Mass., improvements to cost \$50,000; Maine Coated Paper Company, Rumford Falls, Me., new mill; Building Finish Company, Worcester, Mass., new plant to cost \$20,000.

The board of construction and supply, Providence, R. I., will receive bids until June 18 for a 30,000,000 gal. pumping plant.

Philadelphia

PHILADELPHIA, PA., June 9, 1913.

While business during May represented about a fair average, June has been quieter, the past week's volume being below that of the closing week of May. Inquiries have also decreased. Quite a few prospective buyers have deferred purchases. Considerable attention will be given to the coming conventions of the Master Car Builders and Master Mechanics at Atlantic City, beginning June 11. The exhibit of machinery and tools in connection with the convention promises to be large. Current orders have been mostly for small tools, usually for single tools. Occasional scattered orders for equipment come from the railroads, but expected active buying has not yet developed. A somewhat better demand for overhead traveling electric cranes has appeared and some business has been placed. Boilers and engines have been in fair demand. A moderate amount of business is moving in second-hand machinery and tools, but the market lacks snap. Labor trouble still threatens to interfere with gray iron foundries.

The Central Machine Company is having plans prepared by Peuchert & Wunder, engineers, for a three-story and basement, reinforced concrete and brick machine shop and manufacturing building at Seventh, Franklin and Wood streets. It will be 44 x 110 ft. The first floor and basement will be used for machine shop purposes, and the upper floors for general manufacturing. Power equipment and machine tool equipment will be considered later.

Contracts have been let by John C. Raum & Son, Baltimore, Md., for the erection of a two-story manufacturing building 63 x 126 ft., at 405 South Sharp street. The building will be used as a wagon works and paint shop.

The Standard Refrigerator Company is having plans prepared for a two-story addition 36 x 120 ft., for general manufacturing purposes, at its plant at 2539 to 2543 Germantown avenue. No additional power equipment will be required although later on some purchases of wood working machinery may be made.

The William Steele & Sons Company has prepared plans for a manufacturing building to be erected at 2429 to 2449 North Broad street, for the E. A. Wright Bank Note Company, which has recently acquired the site. It is not decided when bids for the construction of the building will be taken.

Builders are estimating on a large addition to the Ritz-Carlton Hotel, at Broad and Walnut streets. The addition will be 60 x 138 ft., eighteen stories high, and built from plans by Horace Trumbauer.

Plans and specifications are out for a 54 x 800 ft. pier to be erected at Locust Point, Baltimore, Md., for the Baltimore & Ohio Railroad. M. A. Long, Baltimore, Md., is the engineer.

The chairman of the committee, F. A. Finkelday, will receive bids until June 15 for a power station, boiler, generating equipment and other electrical work for Camden, N. J.

The Union Mfg. Company, Boyerstown, Pa., has added some new equipment to its foundry department and is considering the installation of an electric lighting plant, cupola, molding machines, sand blast, and tumbling barrels.

John Pfeifer & Co., Ltd., have let a contract for the erection of a 40 x 70 ft. brick forge shop at 146-148 Broad street, being an extension to the present shovel making plant. Additional equipment for forging purposes will be considered at a later date.

The Pennsylvania Railroad is taking estimates for the erection of a pumping station at Hillside, Pa., from plans by its own engineers.

Chicago

CHICAGO, ILL., June 9, 1913.

The Divine Motor Car Company, Chicago, has been incorporated with a capital of \$10,000 to engage in the manufacture of motor vehicles by E. C. Divine, 2430 South Michigan avenue, H. E. Campbell and W. R. Mitchell.

The plant of the Waterloo Drop Forge Company, Waterloo, Iowa, has been sold and the machinery will be moved to Waverly, Iowa, where a factory building already erected is to be remodeled for occupancy.

The Western Implement & Motor Company, Davenport, Iowa, builder of tractors and cotton picking machinery, for which plans for a large factory at Davenport were prepared, is now having plans drawn for a \$50,000 plant at Cedar Rapids, Iowa. A reorganization of the company has been effected. The present officers are W. H. Haskell, Cedar Rapids, Iowa, president; H. E. Sudlow, Rock Island, Ill., and J. F. Appleby, Davenport, Iowa, vice-presidents; W. M. Smith, secretary, and E. F. Bard, treasurer.

The Globe Mfg. Company, Perry, Iowa, is considering the disposal of its present plant and the erection of a much larger factory, the main building of which would be 250 ft. long.

The Vulcan Iron Works, Mason City, Iowa, has been reorganized. The plans of the company under the new regime provide for considerable extensions of the manufacturing capacity.

The Ward Pump Company, Rockford, Ill., is completing the erection of a three-story addition to its plant, part of which will be used for pattern storage and part for machine shop purposes.

The American Can Company, Chicago, is having plans prepared for a three-story factory, 200 x 260 ft., to be erected on Clybourn avenue at a cost of \$300,000.

The Star Motor Company, Chicago, has had plans prepared for a one-story garage, 200 x 200 ft., to be erected at Twenty-second street and South Park avenue. The estimated cost is \$50,000.

The West Coast Roofing Company, Chicago, has secured a building permit providing for the erection of a one and two-story factory, 100 x 328 ft., to cost \$70,000.

The J. B. Klein Foundry & Wire Company, Oklahoma City, Okla., has completed the first section of its new foundry, 65 x 135 ft. The erection of a second building, 50 x 140 ft., two stories, will be started within a few months.

The Charles City Engine Company, Charles City, Iowa, is rapidly pushing the construction of its two new factory buildings. It is expected that the new plant will be in operation by August 1.

The Paxton-Mitchell Company, Omaha, Neb., is contemplating the erection of an addition to its iron and brass foundry, to be 75 x 200 ft.

The foundry of the Hart Grain Weigher Company, Peoria, Ill., was damaged by fire to the extent of \$7,500 last week, the loss applying on both machinery and building.

The Baldwin Locomotive Works has let contracts for the construction of its East Chicago plant, the plans calling for a main building, 600 x 1150 ft. It is expected that the masonry work will be started July 1.

The Prest-O-Lite Company, Indianapolis, Ind., has acquired a seven-acre tract in St. Louis Park near Minneapolis, Minn., on which it plans to erect a large plant.

The Lake Shore Engine Works, Marquette, Mich., recently purchased one 18 in. x 12 ft. and one 18 in. x 30 ft. Prentice lathes and have installed a Pawling & Harnischfeger electric traveling crane.

The Felt & Tarrant Mfg. Company, Chicago, manufacturer of the comptometer, is building a two-story addition to its plant, the cost of which is estimated at \$25,000.

The Mogul Motor Truck Company, Chicago, is moving its manufacturing operations to St. Louis, Mo., where a factory has been leased which will afford the company manufacturing capacity for 500 trucks a year.

The city engineer, C. E. Durland, Billings, Mont., will receive bids until June 17 for a pumping plant.

The fire and water committee, Canton, Ill., will advertise for bids for a new boiler for the Avenue D pumping station.

Citizens of Hendrick, Iowa, have voted in favor of the construction of municipal waterworks.

Warroad, Minn., will issue \$30,000 bonds for waterworks and for an electric lighting plant.

A \$10,000 bond issue will finance the construction of waterworks for Columbus, Neb.

Milwaukee

MILWAUKEE, WIS., June 9, 1913.

Small orders for machinery continue to come in steadily and these, with work already in hand and on the books, make for a fairly busy season. Nothing big has developed recently, and no large orders are in immediate prospect. Heavy machinery men report business quiet, but there is nothing to warrant any retrenchment. An encouraging sign in the labor situation is the settlement of the strike of ironworkers, who have tied up several large buildings for many weeks. Structural, ornamental and sheet metal employers have granted wage demands and are now running their shops full speed to overcome the delay in executing orders caused by strikes. Other shops are having slight difficulty in filling payrolls with competent men.

The new gray iron foundry under construction for the National Brake & Electric Company, Milwaukee, will be ready for operations in July. It is expected that the first heat will be taken off not later than July 15. The capacity is 75 tons per day and the main molding floor has dimensions of 110 x 240 ft.

The Badger Pattern Works, Milwaukee, has been incorporated with a capital of \$3000 by George Lubert, Dell Dennis and W. L. Whitthuhn.

The Milwaukee Gas Light Company is preparing to erect liquid product bins at the main gas works, Erie and Jefferson streets, Milwaukee, at a cost of \$35,000.

The Clark Grain & Fuel Company, Chippewa Falls, Wis., awarded the contract for machinery for a new elevator and a new coal handling plant to the Gifford-Wood Company, Chicago.

The Manitowoc Shipbuilding & Dry Dock Company, Manitowoc, is having plans prepared for a modern office building of three stories. Several buildings on the site of the new structure are being razed. It is the intention to erect later a new steel shop and warehouse building.

The Milwaukee Forge & Machine Company has been organized with a capital of \$8000 by Charles Hartson, John Eckert and George B. Pillar.

John B. Mooney, Charles D. Bremer and William C. Lund of Milwaukee have organized the B. & M. Mfg. Company, capital \$10,000, to manufacture gasoline engine appliances, including spark indicators and intensifiers.

The Herman J. Schlégel Mfg. Company, Appleton, will erect a foundry 30 x 147 ft., one story. The building will contain a grinder room, 20 x 20 ft.; molding room, 30 x 50 ft.; pattern shop, 10 x 20 ft.; assembling room, 20 x 30 ft., and warehouse, 30 x 40 ft. The company has been manufacturing electrical washing machines and similar electrical appliances and the new facilities will enable it to add a line of hot-air furnaces.

The Freeland Steel Tank Company, Portage, is enlarging its capacity. The company is hardly able to cope with orders and for some weeks has operated on overtime schedule.

The Allis-Chalmers Company has sold to the city of Conway, Ark., for its municipal lighting and power plant, a 16 x 36-in. Corliss engine with a 190-kva. generator and auxiliary apparatus.

Articles of incorporation have been filed by the Brumm-Chapman-Herman Company, Milwaukee, with a capital of \$10,000. The company will engage in construction, drainage and dredging work.

Latest reports in regard to the re-establishment of the Chicago shops of the Chicago & Northwestern Railroad Company point to the selection of a location between Kenosha, Wis., and Winthrop Harbor, Ill. These reports are partially substantiated by the statements of bankers and real estate men. The present Chicago shops are to be abandoned because of insufficiency and the company's inability to purchase additional acreage adjoining them.

The Harvey Forging Company, Racine, is building a large addition to its plant at Racine Junction which will double its production.

The Wisconsin Foundry Company, Racine Junction, Wis., organized by Earl Alber and K. Thompson, is building a foundry 60 x 80 ft. for general jobbing work in gray iron.

The George J. Meyers Mfg. Company, Milwaukee, is building a three-story machine shop, 140 x 150 ft., to be added to its present boiler and machinery manufacturing plant.

The Porto Metal House & Garage Company, Milwaukee, has been incorporated with a capital of \$5000 to build portable structures. The incorporators are J. E. Tracy, L. P. Weber and P. G. Meyer.

Jacob Wellauer, Milwaukee, has taken out a building permit covering the erection of a five-story manufacturing building between Milwaukee street and Broadway on Chicago street. The building is to be 60 x 120 ft., and to cost \$58,000.

The Dauber-Kratsch Company, Oshkosh, Wis., has been incorporated with a capital of \$25,000 to engage in a general manufacturing business by Charles G. Dauber, William H. Kratsch and O. Dauber.

The Bayley Mfg. Company, Milwaukee, manufacturer of blower systems and fans, has been purchased by A. N. Becker and associates who will continue the business under the present name.

Detroit

DETROIT, MICH., June 10, 1913

Business conditions in the local market exhibit no marked change from those reported last week. Only a fair run of orders is reported and these are largely of the single tool class. A moderate amount of miscellaneous inquiry is before the trade but there is nothing in the outlook which denotes any promise of more active conditions. Some requirements in power plant equipment are being figured on which will result in good business. Conditions throughout the industrial centers of the state are in keeping with the local situation; business is reported as being light and without any special features. Some installations of mining machinery are reported from the upper peninsula. The labor troubles reported last week still exist and indications are that the discontent may spread further. The volume of new construction work shows a decrease.

The Palmer Motor Car Company, Detroit, recently organized, has begun the construction of the first unit of its plant which will be located at Ecorse, a Detroit suburb. The structure will be of reinforced concrete construction, one story, and 80 x 355 ft. The W. E. Wood, Company is the engineer in charge.

The Michigan Grinding Company, Detroit, has been incorporated with a capital stock of \$200,000 to manufacture gear grinding and other machinery. Lester W. Wanamaker, John A. Russell and John E. Sullivan are named as incorporators.

The Auto Sand Grip Company, Detroit, has been incorporated with \$40,000 capital stock to manufacture automobile parts and accessories. The incorporators are G. Sanderson, K. V. Shotwell and J. B. Williams.

The Cooper Improved Roller Valve Company, Detroit, has been incorporated by Lyman Cooper, Charles C. Merritt, M. B. Lamkins and others, with a capital stock of \$30,000. The new company will manufacture valves and steam traps and do a general machine shop business.

It is reported that the Frazer Paint Company, 665 St. Aubin avenue, Detroit, will build a two-story brick addition to its factory.

The Chicago Clamp Company, Detroit, has been incorporated with \$10,000 to manufacture clamps. The incorporators are Abraham Rubiner, Moras Taylor and Max Katz.

The Edgar Sugar Company, Detroit, has taken out a building permit covering the erection of a two-story factory and warehouse 82 x 220 ft., to cost \$43,000.

The Detroit Ball Valve Company, Detroit, has been organized by Frederick D. Harrison, George Graham and others to manufacture and deal in valves, gauges and engineering supplies. The new company is capitalized at \$100,000.

The New Mfg. Company, Detroit, has been incorporated with a capital stock of \$150,000 to manufacture automobiles. C. W. Jackson and B. W. Denison are the principal stockholders.

The Detroit Engraving & Color Type Company, Detroit, has been incorporated by H. P. Miller, M. A. Vanderkloot and others with \$10,000 capital stock to manufacture printing plates.

At a special election held June 3, the city of Saginaw, Mich., granted a franchise to a syndicate headed by Herbert F. Wills, for the installation of a central heating system. Work will be started on the new plant at once.

The planing mill of the W. L. McManus Lumber Company, Petoskey, Mich., was destroyed by fire June 6, entailing a loss of over \$100,000. Information as to the rebuilding of the plant is not yet available.

The Worthing & Alger Company, Hillsdale, Mich., manufacturer of fur robes, has increased its capital stock from \$110,000 to \$150,000 to provide for extensions to its mechanical equipment.

Ground has been broken for the new plant which

the Electric Nail Company, Battle Creek, Mich., will erect. A part of the plant will be occupied by the Michigan Metal Products Company, whose output will be largely increased.

Bids will be received until June 18 by Homer Fish, village clerk, Saline, Mich., for waterworks.

Indianapolis

INDIANAPOLIS, IND., June 9, 1913.

The Indiana Public Utility Commission has given the city of Bluffton, Ind., permission to issue \$20,000 in bonds to provide for the purchase of an engine, two boilers and other equipment for the municipal electric plant, the total cost of the improvements to be \$25,300.

The Indianapolis Aluminum Casting Company, Indianapolis, has completed its new plant at Fulton and Walnut streets. The company is capitalized at \$50,000. Its foundry will cast aluminum exclusively, mainly automobile parts. Ferd Holloway is president; F. E. James, vice-president; A. Potts, general manager; Daniel Frawn, superintendent.

The Cole Motor Company, Indianapolis, has let the contract for a four-story addition to its plant, to cost \$175,000. The building will be 100 x 500 ft. When this building is completed, another of four stories will be erected on the site of the one-story building now comprising the company's present plant. The capacity of the enlarged plant will then be 6000 automobiles a year.

Business men of Washington, Ind., have organized an association for the purpose of inducing factories to locate there. A. S. Barrows is president; Dr. T. F. Spink, vice-president; C. E. Hayes, treasurer, and John Sinnott, secretary.

Fire caused a loss of \$40,000 to the Mais Motor Truck Company, Indianapolis, June 5. The loss was mainly in the pattern shop. A two-story brick warehouse was destroyed. New buildings will be erected.

The Orr Iron Company, Evansville, Ind., has been incorporated, with \$300,000 capital stock, to deal in iron. The directors are James L. Orr, Samuel L. Orr and Edward H. Mann.

The Knott Mfg. Company, Ft. Wayne, manufacturer of plumbers' and machinery supplies, has increased its capital stock from \$40,000 to \$65,000.

The Modern Cabinet Company, Indianapolis, has increased its capital stock to \$150,000.

Under the direction of John Jarell, the business of the La Fayette Fence & Machine Company, La Fayette, Ind., whose plant was rendered unusable by the recent flood, will be conducted in a new building in which new machinery is being installed.

Cleveland

CLEVELAND, OHIO, June 10, 1913.

The demand for machine tools is only moderate. Dealers are getting a scattering lot of single tool orders but no sales of several tools or inquiries for lots of more than three or four machines are reported. The demand for second-hand machinery is fairly good, being considerably more active than the demand for new machinery. Local machine tool builders generally report conditions as quite satisfactory. The demand for automatic machinery is not as heavy as a few weeks ago, but makers of turret lathes report that the volume of their business is holding up well. The demand for cranes continues very good. While manufacturing plants generally are well filled with work there has been a falling off in orders for various lines. This, however, is to a certain extent due to the fact that manufacturers and middlemen are not buying so far ahead or carrying as large stocks as they were a few months ago.

The National Screw & Tack Company, Cleveland, will enlarge several of its departments by the erection of a five-story and basement brick and steel building, 54 x 210 ft.

The city of Cleveland is in the market for a rotary dryer for the municipal garbage disposal plant. Bids will be received by W. J. Springborn, director of public service, until June 20.

The plant of the Elyria Gas & Power Company, Elyria, Ohio, has been sold by J. C. Hill, trustee of the Union Tool Company, of Los Angeles, Cal. The new owner, who is a large manufacturer of gas and oil machinery, also purchased four acres adjoining the plant. It is stated that the plant will be considerably enlarged.

The Federal Metal Company, Cleveland, which was

recently organized, has acquired a site on Morgan avenue, S. E., on which it plans to begin shortly the erection of a plant for the manufacture of various brass products.

The recently incorporated Akron Steel Casting Company, Akron, Ohio, is establishing a steel castings foundry on West State street in that city, and will engage in the manufacture of a jobbing line of steel castings. The plant will be equipped with a two-ton converter. The plant will be owned and managed by A. A. Griffa, formerly superintendent of the Christy Steel Foundry Company, Akron. The Christy company's plant recently burned and its owners have decided not to rebuild.

Bucyrus, Ohio, has voted in favor of \$180,000 bonds to construct a municipal waterworks.

The Timken Roller Bearing Company, Canton, Ohio, announces that it will build a large extension to its plant during the present summer. It is expected that the work of erection will be started as soon as a site can be secured. The addition will probably include two or three reinforced concrete buildings.

Inquiries are out for machine tools for the new machine shop to be established in connection with the Ohio State Hospital at Lima. The list included two lathes, a radial drill, a shaper, and a grinder. Bids will be received by the board of commissioners until June 16.

The Steel Improvement Company, Cleveland, the organization of which was recently noted, is erecting a building on Windsor avenue containing about 5000 sq. ft. of floor space which will be used for a furnace room. Twelve furnaces will be installed ranging from 10 ft. to small sizes. The company also will erect another building to be occupied by its laboratories and offices. It plans to do high grade work in heat treating and will make a specialty of rolls and dies and heat treated drop forgings. The company plans to build most of its own furnaces, but will be in the market for blowers and two or three motors.

Cincinnati

CINCINNATI, OHIO, June 9, 1913.

The machine tool builders in Cincinnati, while still quite busy, state that their efforts are confined principally to filling old orders. New orders are coming in but slowly, and indications point to a dull business in the future. Many of the larger manufacturers are hopeful, but state plainly that unless considerable new business is booked soon they will be compelled to curtail operations. The railroads now appear to be the best prospective customers. A large number of local machine tool manufacturers and their salesmen are in attendance at the Master Mechanics' convention at Atlantic City.

The American Laundry Machinery Company, Norwood, Ohio, has let the contract for a large addition to its plant. Special equipment will be required, including electrical machinery.

G. A. Schacht, Cincinnati, is the head of a new firm that has leased the plant of the C. R. Talbott Company, on Spring Grove avenue, and will fit it up for the manufacture of auto trucks. A partial list of machine tools has been made up.

A large addition to the Norwood plant of the Globe-Wernicke Company, Cincinnati, is now being planned by Harry Hake, architect. The proposed extension will add about 140,000 sq. ft. of floor space to the company's plant, and it will be used entirely for the manufacture of metal furniture. Nothing is yet known as to machinery requirements.

Thomas J. Nichol & Co., Cincinnati, have acquired a site at Plum and McFarland streets, on which they expect to erect a plant for the manufacture of heating apparatus and plumbing specialties. No definite plans will be made up for several months.

The Pharis Tire & Rubber Company, Columbus, Ohio, has increased its capital stock from \$25,000 to \$50,000, and is planning some additions to its plant at Newark, Ohio.

The Hill-Brunner Foundry Supply Company, Cincinnati, is a new company, organized by John Hill and F. J. Brunner. Its plant is located at 2100 South street, and will manufacture and carry a full line of foundry supplies. Branches will be maintained at Birmingham, Ala., and Chattanooga, Tenn.

The Miners' Light & Power Company, Charleston, W. Va., has been incorporated with \$250,000 capital stock. Joseph H. Gaines is named as one of the principal incorporators.

Plans are ready for the proposed six-story building to be erected by the E. M. Hulse Company, Columbus,

Ohio. The company's factory was practically destroyed by fire several weeks ago.

Samuel Hannaford & Sons, Cincinnati, are completing plans for a new factory building to be erected at Chillicothe, Ohio, for the American Patent Pad & Textile Company. Nothing is known as to machinery requirements.

The Reliance Engineering Company, Cincinnati, has been commissioned to prepare plans for a water-gas plant for the municipality of Lebanon, Ohio.

The Ferro Concrete Construction Company, Cincinnati, will soon commence the construction of a seven-story printing plant for the Standard Publishing Company, Cincinnati.

The Simpson Heater Company, Newark, Ohio, has changed its name to the Simpson Foundry Company.

Wheeling

WHEELING, W. VA., June 9, 1913.

The plant of the West Virginia Paper Products Company at Parkersburg, W. Va., is being enlarged and equipped with an addition of \$10,000 worth of new machinery.

The Wheeling Electrical Company has received at its plant in Wheeling, W. Va., a new 5000-kw generator, the largest owned by any plant in this section of the country.

The Dana-Guthrie Lumber Company, Charleston, W. Va., has been incorporated with \$50,000 capital by H. A. Lightner, A. S. Guthrie, R. K. Ford, J. S. Dana and W. E. R. Byrne.

The Miners' Light & Power Company, Charleston, W. Va., has been incorporated to produce electricity, own coal mines, water power, etc. Capital stock is \$250,000; incorporators are J. H. Gaines, A. B. Koontz, G. G. Todd, F. R. Hurlbutt and R. Kemp Morton. The same men incorporated the Gauley Power Company also, with \$250,000 capital stock.

The Portsmouth Culvert Company, Portsmouth, Ohio, has been incorporated to manufacture metal culverts and other specialties. Capital stock is \$5000; incorporators are Philo S. Clark, H. A. Schirmann, George E. Kricker, Fred N. Tynes and F. W. Knowles, all of Portsmouth, Ohio.

The right of way for the air line of the Northern Virginia Electric Light & Power Company between Martinsburg and Berkeley Springs, W. Va., has been completed. A trolley line will be built at once. The new electric plant of the company at Winchester, Va., will be one of the largest in the country.

The Wheeling-Monroe Coal Company, Wheeling, W. Va., has been incorporated with \$25,000 capital stock by J. C. McKinley, N. A. Haning, H. B. Lockwood, L. W. Brown and Harry O. Wells.

The Central South

LOUISVILLE, KY., June 10, 1913.

Business has hit about a mean for this time of the year, "fair to middling" being a characteristic and accurate expression as to the state of trade. Many machinery lines which are seasonable in nature are featured in this market, and it happens that just now is not a particularly good time of the year for their sale. Boilers and other power equipment, including electric motors, are selling fairly well, and there is some inquiry for ice machines and stone-working equipment. With crop prospects in the corn belt and the wheat-producing sections excellent, attention is now being devoted to the cotton crop, which is now being planted in the South, and on the result of which business during the latter part of the year will largely depend.

The Henry Vogt Machine Company, Louisville, reports that while some excellent sales have been made and prospects are more numerous than usual for this time of the year, the situation is generally quieter. Shorter hours will prevail beginning this week.

The New Albany Mfg. Company, New Albany, Ind., has shipped a good many pieces of equipment to the Northwest. Seattle having been a good market recently. All-steel derricks are continuing to be a good line with this concern. Conditions generally are fairly quiet.

Brinton B. Davis, Inter-Southern Building, Louisville, has been selected as the architect for Parr's Rest, a home for aged women, to be built in Louisville. The equipment will be unusually elaborate, including a steam-heating plant, laundry machinery and other items. The total cost will be several hundred thousand dollars.

The Louisville Machine Company has recently been started to engage in the sale of second-hand machinery. Quarters have been established at 308 East Main street. For the present repair work will not be done, but a machine shop probably will be equipped a little later. The company recently purchased a large lot of brass-working equipment.

The Art Brass & Plating Works, 448 South Fifth street, Louisville, has begun the manufacture of a patented reversible sadiron, operated by gasoline, and has met with sufficient success to justify plans for enlarging capacity. Carl Kindt is president.

Announcement of plans for a bond issue of \$1,000,000 for school purposes has been made in Louisville, and it will be voted on at the November election. If the bonds are issued the proceeds will be used for the construction of nine new school buildings at a cost of \$853,000, in addition to the establishment of manual training and trade schools, which are expected to be a feature of the system. E. O. Holland is superintendent of schools.

The Fidelity & Columbia Trust Company, Louisville, has charge of the sale of the factory and power equipment of the Hope Worsted Mill, Louisville, which was bought by the bondholders to wind up bankruptcy proceedings. The equipment includes three 228-hp. Babcock & Wilcox boilers, feed-water heater, boiler feed pump, Hamilton-Corliss engine and 22-kw generator and switchboard, with lighting equipment.

Definite plans have been made for the rebuilding of the sawmill of the Wood Mosaic Company, New Albany, Ind., at Highland Park, a suburb of Louisville, following the fire which destroyed the old plant. The new mill will be equipped with entirely new power machinery. Standard lumber manufacturing equipment will be needed.

The Jefferson fiscal court, Louisville, will install two electric elevators in the county courthouse. Bids will be received in the near future.

Wm. Schuff & Co., Louisville tanners, who have begun work on an addition to their plant, report that the chief requirement will be for motors to operate cutting machinery. Most of the latter is already on hand.

J. M. Culver, Fulton, Ky., has announced plans for the establishment of an ice cream factory in that city. Machinery will be purchased at once.

The Brown Auto Company, Maysville, Ky., is reported to be planning the equipment of an automobile repair shop. Mike Brown and W. B. Tully are interested.

The city of Corbin, Ky., has awarded a contract for the construction and installation of a waterworks system to the American Light & Water Company, Chicago, at a cost of \$26,794.

The Hopkinsville Apartment Company, Hopkinsville, Ky., will need a steam heating plant for a large apartment building it plans to erect in that city. A. D. Noe, Sr., is interested.

The Weyman-Bruton Tobacco Company, Paducah, Ky., is reported to be planning the erection of a large snuff factory, a site having been secured for the building. O. H. Hank is manager.

Crump & Field, wholesale grocers, Ashland, Ky., will equip a coffee roasting department. Cutting, weighing, roasting and conveying machinery will be needed. The equipment will probably be motor driven.

An automobile repair shop will be built and equipped by Hackworth & Cowles, Shelbyville, Ky.

The W. G. Thompson Veneer Company, Edinburg, Ind., has been organized with \$35,000 capital stock and will build a large veneer mill.

The Warrick County Coal Company, Boonville, Ind., has been incorporated with \$350,000 capital stock and will develop a large tract of coal land by the striping process. The office of the company is at Evansville, Ind. H. C. Hays, A. C. Owen and W. H. Hays, Sullivan, Ind., are interested.

The Chickasaw Machine & Foundry Company, Memphis, Tenn., recently incorporated with \$20,000 capital stock, will manufacture oil mill, sawmill and other special machinery, while the Chickasaw Iron Works, the plant of which will be used by the former concern, will confine its attention to structural fabrication.

J. W. Hastings & Son, Big Sandy, Tenn., will build a new sawmill to replace the plant recently burned. The equipment will be bought this month.

A mill for the manufacture of slack barrel staves is to be located at Memphis, Tenn., by J. J. Russell.

Large machinery requirements are announced by the Cumberland Mountain Land Syndicate, James

Building, Chattanooga, Tenn., which plans the development of 21,600 acres of coal land near Whitwell, Tenn. A central power station will be installed and electric current generated for a coal haulage system, fan and pump operation, etc.

Richton, Miss., is planning to issue \$10,000 of bonds for the purpose of building a water system.

The Bell Lumber & Mfg. Company, Columbus, Miss., will add a sawmill to its plant, which now consists of planing mill machinery exclusively.

M. L. Culley, city engineer, Jackson, Miss., is in the market for a 100-hp. boiler.

The Virginia Iron, Coke & Coal Company, Stonega, Va., will extend its railroad from Norton, Va., to the Guest River field and develop a large acreage of coal land in that section.

Henry A. Mentz, Memphis, will prepare plans for a \$15,000 waterworks plant for Dresden, Tenn.

Birmingham

BIRMINGHAM, ALA., June 9, 1913.

With a continuance of construction operations on an unprecedented scale, extension of railroad trackage in the state and hydroelectric and mine development, the machinery business is good. Machine tools are not so active, but there is considerable business in engines and boilers.

The Tri-State Oil Company, Mobile, Ala., has been chartered with a capital stock of \$100,000 to sink oil wells in Mobile County. C. L. Reed is manager.

The Steel Cities Chemical Company, Birmingham, manufacturer of sulphuric acid, contemplates a \$100,000 addition to its plant. Culpepper Exum is president.

The Louisville & Nashville Railroad will establish at Boyles, a suburb of Birmingham, foundry and machine shops for overhauling locomotives in addition to the car shops already there. These additions and other improvements planned will total \$1,000,000.

Frank L. Fuller, Concord, N. C., has been granted a franchise for establishing a gas plant in Griffin, Ga.

Sulzberger & Sons will establish a cold storage plant at Valdosta, Ga. C. H. Thompson is local manager.

C. B. Wellborn, mayor, Royston, Ga., will receive bids until July 1 for waterworks and sewers.

The Universal Plow Company, Florence, S. C., J. Allen Higgins, general manager, will buy a bulldozer, taper roll, trip hammer and foundry equipment.

J. N. Hazelhurst, Atlanta, Ga., is preparing plans for a municipal gas plant at La Grange, Ga.

J. B. McLendon and A. H. and W. L. Keller will erect an ice factory at a cost of \$100,000 in Miami, Fla.

Extensive additions will be made to the plant formerly operated by the Woodward Mfg. Company at Augusta, Ga., by H. Roscoe Perkins and Henry C. Maxwell, the purchasers. They will manufacture sash and doors and do high grade mill work.

Leon Wilson and W. E. Goldsmith will establish a machine shop in connection with a garage at Titusville, Fla.

Frank Stollenwerck and Pope Foster are building a sawmill at Montgomery, Ala.

The property of the Alabama Portland Cement Company at Demopolis, Ala., has been purchased by T. M. Wingo and A. A. Kline, of El Paso, Tex.

C. A. O'Neal, of Andalusia, Ala., and associates, who paid \$700,000 for extensive lumber interests in Tuscaloosa County, will erect a large sawmill and otherwise develop their holdings.

St. Louis

ST. LOUIS, MO., June 9, 1913.

The machine tool market continues in quite a satisfactory state. The flow of purchases, while still confined to single tools and small orders, makes up an aggregate that is really good. The demand for second-hand tools continues larger than the supply of standard makes available, and there are expectations that with a settling down in sentiment there will be an increase in new business.

The Missouri Engine Company, St. Louis, has been incorporated with a capital of \$35,000 by Adolph E. Winkelmeyer, Hugo and Charles Lippert and Harry Bain to equip a plant for the manufacture of internal combustion engines and to do a general metal manufacturing business at 2810 North Eleventh street. It will develop the manufacture of coal oil using engines.

The plant of the Carondelet Foundry Company, of St. Louis, was considerably damaged by lightning June

5, the loss being chiefly confined to the molding room which will have to be refitted.

The St. Louis Match Company, St. Louis, has been incorporated with \$300,000 capital by W. Russell Samuel, W. McRea, W. S. Ringo, and others, and will at once equip a plant at St. Louis with continuous match-making machinery.

The Liberal Light Company, Liberal, Mo., has been incorporated with \$7,200 capital by C. Lipscomb, M. M. Jones and C. H. Dixon, and will equip an electric plant.

The Buckner-Ragsdale Stone Company, Sikeston, Mo., has been incorporated with \$10,000 preliminary capital by C. M. Buckner, W. B. Ragsdale and A. B. Gibbs to equip for stone quarry operation.

The Thomas Powers Mfg. Company, Cape Girardeau, Mo., has been incorporated with \$15,000 capital by W. C. Mattingly, R. J. and Thomas Powers to equip for a general manufacturing business.

F. W. and R. A. Tomlinson have acquired a franchise from the City Council of Mena, Ark., authorizing them to equip and operate an electric light and power company.

The Missouri, Oklahoma & Gulf Railroad has accepted a bonus from the city of Muskogee, Okla., and will construct and equip a shop at a cost of about \$150,000 for buildings and will expend considerably more than that sum for equipment.

The Vale Brick Company, of which George C. Stephens of Kansas City, Mo., is president, will build a plant with a daily capacity of 75,000 bricks.

The Holdenville Cotton Compress Company, with \$15,000 capital, has been incorporated at Holdenville, Okla., by M. E. Gilbert, C. C. Leach, E. Arnold, J. A. Russell and M. A. Loftus, and will equip to handle the present crop.

The Farmers' Co-operative Gin Company, Stone-wall, Okla., recently incorporated with \$12,000 capital, will install machinery to cost about \$7500. The president is L. M. Chandler, who announces that the company is in the market for equipment.

An electric light plant is reported to be planned for Waldron, Ark., by S. J. Hill and W. P. Harris.

The waterworks of Bastrop, La., are to be enlarged and considerable new equipment added under the supervision of Mayor J. K. Skipwith.

The electric light plant at Dexter, Mo., controlled by Benjamin F. Eicholtz, has plans for the addition of a 125-kw., three-phase, 2300-volt generator.

The city light and water plant of Oregon, Mo., Morton R. Martin, resident engineer, is prepared to receive bids on considerable equipment to be installed at once.

The city of Valliant, Okla., under the direction of E. W. Gantt, engineer, Dallas, Tex., has plans for the construction and equipment of a \$50,000 electric light, power and water plant.

The Purified Gasoline & Oil Company, Texarkana, Ark., has been incorporated with \$60,000 capital, by J. W. Miller, J. O. Battle and others to build a plant with a daily capacity of 50,000 gal. for the manufacture and purification of gasoline.

An ice plant is planned by the R. D. Leas Fuel Company, Little Rock, Ark.

The Spiller Sugar Company, Plaquemine, La., has plans for a plant for cane sugar, etc., to cost about \$60,000 and to have a capacity ultimately of 3000 barrels. The company was recently incorporated with \$50,000 capital.

The Whaley Lumber Company, Coushatta, La., will build a large sawmill at Campti, La., at once.

The Big Bayou Lumber Company, Langford, Ark., has been incorporated with \$10,000 capital for the equipment of a large mill.

The Edwards Lumber & Mfg. Company, Bay St. Louis, Miss., with \$30,000 capital, has been incorporated by John K., George H. and Edwin W. Edwards and will equip a plant.

The Balle Mfg. Company, Columbus, Miss., has decided upon the installation of a lumber plant of 15,000 ft. daily capacity.

The Brown Lumber Company, Okmulgee, Okla., has been incorporated with \$20,000 capital, by Allen Brown and W. E. Pancoast of that city and F. E. Wear of Kansas City, Mo., and will equip a mill.

The Rockwell Mfg. Company, Camden, Ark., recently incorporated with \$50,000 capital, has plans for adding considerable equipment to the plant of the Valley Lumber Company, which it has acquired.

The city of Cushing, Okla., has completed plans for the construction of a sewage system including septic tanks with necessary mechanical equipment.

The Southern Hydroelectric Company, New Orleans, La., with D. L. Rush as president, is planning to develop water power on small streams in Louisiana for small public service plants.

A waterworks plant has been determined upon at Coldwater, Miss. It will be built under the direction of C. L. Graham.

The sawmill of the Athens Lumber Company, Athens, La., is reported burned with a loss of \$25,000. It is stated that it will be replaced.

The cotton gin of P. W. Slaton at Granite, Okla., has been burned with a loss on equipment of \$12,000. It is to be rebuilt.

The Little Rock, Pine Bluff & Eastern Traction Company, of which C. C. Kavanaugh of Little Rock, Ark., is president, has completed plans for the construction of about 50 miles of electric line with power house equipment, etc.

Texas

AUSTIN, TEXAS, June 7, 1913.

One of the features of the machinery trade in Texas at this time is the unusually large demand for machinery and equipment for public utility plants. Special attention is being given to bringing waterworks and electric light and power plants up to the highest possible standard. Before the cotton season opens there will be a number of new cotton-seed oil mills and compressors erected. The situation in Mexico shows no improvement and American machinery men are making no effort to do business in that country at this time.

W. J. Hefley and associates will construct a cotton-seed oil mill at Fort Worth at a cost of about \$90,000. The plant will be equipped with ten presses and have a daily capacity of 100 tons. The mill building will be 60 x 150 ft.

The Fort Worth Power and Light Company will double the capacity of its electric light and power plant at Fort Worth. Among the equipment to be installed are eight new boilers with a total of 4000 hp.

The Ford Motor Company will erect an automobile assembling plant at Dallas. It has accepted plans for a five-story reinforced concrete and brick building in which the machinery will be installed.

The Alvord Quarry & Construction Company, Fort Worth, has been organized with a capital stock of \$100,000. The incorporators are C. R. Bardin, J. T. Hughes and W. L. Gee.

The Farmers' Gin company will erect a cotton gin at Whiterock. G. F. Jordan is interested.

The Texas Cotton Ginners' Association is promoting the construction at Dallas of a large plant for the manufacture of cotton bagging. It is planned that this factory shall be the largest of its kind in the country. All of the stock of the company will be held by owners of cotton gins in Texas and Oklahoma.

The Indio Cattle Company will construct an electric irrigation pumping plant on its property near Eagle Pass.

The Planters' Cotton Oil Company will erect an oil separating mill at Waxahachie.

W. P. Davis and associates will build a cotton-seed oil mill at Lewisville, at a cost of about \$75,000.

The municipal waterworks plant of Denton is to be equipped with an additional pump which will have a daily capacity of 600,000 gal.

The city of Spur has just issued \$25,000 of bonds for the purpose of constructing a waterworks plant and distributing system.

Preparations are being made for the construction of a municipal waterworks plant and distributing system at Henderson.

The Mesa Egyptian Cotton Exchange will construct a cotton gin at Mesa, Ariz.

The Wallace Gas Company is constructing a gas manufacturing plant and distributing system at Corpus Christi.

The Malone Light & Ice Company is doubling the capacity of its power plant at Plainview.

The city council of Kaufman will install additional equipment in the waterworks plant.

The New Mexico Implement Company is building a machine shop at Deming, N. M.

The Oxford Telephone Mfg. Company, Fayetteville, Ark., manufacturer of telephone supplies, is considering the removal of its plant to Houston and will be in the market for engines, boilers and machinery. C. E. Oxford is president of the company.

The Pacific Coast

SAN FRANCISCO, CAL., June 3, 1913.

Sales of machine tools for the latter half of May were somewhat lighter than for a few weeks previous, though some dealers report a very fair business. Buying for the country garage trade continues active, and a few single tools of large capacity are being ordered by local shops. A number of substantial orders are expected within the next few weeks, though little business has been done on the larger inquiries which came out last month. Prospects for the late summer and fall are uncertain. Most shops are well occupied at present, and would undoubtedly buy considerable machinery if assured that business would remain on the present scale, but the tendency is to delay purchases as far as possible.

Woodworking machinery is very quiet, the usual summer buying by box factories, etc., being curtailed on account of the short fruit crop, while city planing mills are not yet very well occupied. Some figuring is being done on large logging and sawmill outfits, but actual orders are slow to appear. The demand for road machinery, excavators, portable crushers and the like, continues active, most inquiries being from towns and counties, and there is still a fair movement of heavy mining and contractors' machinery. The pump business has materially increased, with a demand for irrigating outfits of all kinds and sizes, and local manufacturers are working at full capacity. The market for gasoline traction engines is also in good shape, and the general gas engine business is satisfactory. The electric power situation has been disturbed but slightly by a strike of linemen of a leading power corporation.

The San Francisco office of the Berlin Machine Works has been removed from Fremont street to 241 Monadnock Building, though a number of machines are still carried at the old location.

The C. L. Best Gas Traction Company, San Leandro, Cal., is building a new annealing oven to take care of small work, the present oven being fully occupied.

It is reported that the shops of the Diamond Match Company at Chico, Cal., have made arrangements to manufacture gasoline traction engines of the "caterpillar" type. The company has a well-equipped shop, which is used mainly for the construction and repair of logging machinery.

The Eccles & Smith Company, this city, reports the sale of the following tools: A large heavy-duty radial drill to the Moore & Scott Iron Works, for the Oakland shop; two LeBlond heavy-duty lathes to the Pacific Gear & Tool Works, this city; a LeBlond heavy-duty type universal milling machine to the A. Schneider Engineering Works; and a heavy-duty LeBlond engine lathe to the Doak Gas Engine Company, Oakland.

The Pacific Coast Steamship Company has started the work of converting its steamers into oil burners, the work being done at this port.

A building contract has just been let for the construction of a large mill near Los Angeles for the California Woolen Mills Company.

It is reported that work will soon be started on a bolt factory for the California Industrial Company, Los Angeles.

The city of Santa Cruz, Cal., has placed an order for a pump and motor outfit with the United Iron Works, this city.

The A. L. Young Machinery Company has taken an order to furnish a portable rock crushing outfit to this city. The city will open bids June 18 for a motor generator set for the Geary street car barn.

The Lilly Motor Car & Machine Company has been incorporated at San Diego, Cal., with a capital stock of \$5,000, by Clinton Clark, J. P. and I. M. Lilly, and others.

A lot of new machinery has been installed in the flour mill of the Golden Eagle Milling Company, Petaluma, Cal., which has been closed for overhauling.

The Read & Son Machinery Company, this city, has been incorporated with a capital stock of \$25,000, by D. W., W. D. and N. A. Read.

The Commercial Engine Company has let contracts for two factory buildings at Los Angeles, Cal.

J. W. Locke, now operating in Los Angeles, is figuring on building a foundry and pattern shop at Long Beach, Cal.

Bids have just been received by the town of Palo Alto for a Diesel type engine and electric generator.

The California Portland Cement Company, Holton, Cal., is preparing to increase its capacity by about 3000 bbls. daily.

Los Angeles County will on June 16 sell at auction a lot of machinery at the Pacoima quarry.

Orange County, Cal., has taken figures on road building and crushing machinery.

The Union Oil Company is installing compressing outfits near Santa Maria, Cal., for the production of gasoline from natural gas. The plant when complete will have a daily capacity of about 2000 gal.

Bids will be received until June 18 by the board of public works, San Francisco, Cal., for a machine shop generator.

Eastern Canada

TORONTO, June 7, 1913.

The by-law to provide for the expenditure of \$130,000 for the construction of a waterworks and sewerage system for the town of Wallaceburg, Ont., was carried by a large majority.

A strike has been declared by the molders in the two stove foundries at Sackville, N. B. They ask for an increase of 10 per cent. and a minimum wage of \$3 per day.

The recent developments at the Casey Cobalt Mine, Cobalt, Ont., have exposed so much ore that the directors have decided to increase the capacity of the concentrator from 25 to 75 tons per day instead of 50 tons as contemplated, and to install electric power.

A fire damaged the premises of the Dominion Radiator Company, 146 Craig street west, Montreal, to the amount of \$5,000.

The Canadian Brasive Wheels, Ltd., with a capital stock of \$500,000, has purchased eight acres of land at Dundas, Ont., as a site for its factory and shops. The company will construct buildings to cost at least \$20,000.

A project for the erection of large pulp and paper mills at Haileybury, Ont., and New Liskeard, Ont., is under way which will involve an outlay of several million dollars. A number of British capitalists having large holdings in the Riordon Paper Mills, at St. Catharines, Ont., are behind the undertaking. They have for some time past been on the outlook for a suitable site for the location of mills in the northern portion of the province.

The MacCormack interests, who are completing a new two-machine news paper mill at Thorold, Ont., have decided to build a 75-ton sulphite mill immediately. Warren Curtis, Jr., is the manager at Thorold.

It is announced that the Dominion Power & Transmission Company, Hamilton, will start soon on the construction of a \$1,000,000 auxiliary steam plant, near the foot of James street.

Negotiations were closed for the location of a large branch factory of the Wood Mosaic Company, Inc., of New Albany, Ind., at Stratford, Ont., for the manufacture of veneer tops, panels and wood flooring. George Lapping, a director of the company, has closed negotiations for a site of five acres. A plant to cost \$100,000 is proposed.

City Clerk Boulay, of Hull, Ont., is in communication with J. E. Ray, trade commissioner at Birmingham, England, with reference to having a large manufacturing plant established at Hull. The company will engage in the manufacture of a household commodity and is capitalized at \$600,000.

The Dominion Tire Company, Berlin, Ont., will build a power house to cost \$50,000 in connection with its new \$300,000 manufacturing plant now under construction.

The Massey-Harris Company, Toronto, has completed plans for a factory which it will erect at Brampton, Ont., on a site recently purchased, for the manufacture of gasoline engines.

The Harvey Knitting Company, Ltd., Woodstock, Ont., has issued preferred stock to provide for additional machinery which it will install.

J. M. Loose & Sons, Toronto, manufacturers of piano actions and instrument parts, will build a new factory on a site recently acquired.

The Dominion Mechanic Works, Ltd., Montreal, has been incorporated with a capital stock of \$20,000 by Zephirin Monte, Ernest Charette, and others, to manufacture machinery.

The McKee Furnace Company, Ltd., St. John, N. B., has been incorporated with a capital stock of \$100,000 by James Tennant McKee, Thomas Edward Powers, and others, to manufacture the McKee fuel saver and furnace appliances.

Fire in the Nova Scotia Car Company's plant at Halifax caused damage to the amount of \$10,000.

The Toronto Electric Light Company will expend \$14,000 on a two-story brick addition to its East Esplanade station.

Western Canada

WINNIPEG, MAN., June 6, 1913.

The industrial outlook in western Canada is apparently more encouraging than at any previous date this year. The improvement in the weather in the last two weeks, being favorable for the crops, appears to have given a stimulus to all classes of business. Reports come out regarding the enormous sums of money to be spent this year by the railroad companies, municipalities, etc. The local machinery houses report business steadily increasing, and quite a few substantial orders were booked this week.

The Hudson's Bay Company, the oldest and largest mercantile concern in Canada, announces that work will begin early in 1914 on the erection of a 10-story store in Winnipeg. It will occupy a whole block on Portage avenue, the leading retail street of the city. This building will, of course, use extensive heating and lighting apparatus with freight and passenger elevators.

The Canadian Pacific Railway Company will enlarge its Winnipeg depot facilities, necessitating more powerful operating machinery.

The Ogilvie Flour Mills Company, Ltd., Winnipeg and Montreal, will erect 45,000-bushel grain elevators at Taber and Grassy Lake, Alberta.

It is announced that Moose Jaw and Saskatoon, Sask., have been chosen as the places where the Dominion Government will erect large terminal grain elevators. It is said that each elevator will have a capacity of between 3,000,000 and 4,000,000 bushels. A Government transfer elevator will be built on the Pacific coast.

At a recent meeting of the Fort William City Council it was decided that an issue of debentures to the amount of \$1,212,400 for waterworks should be made.

James Parker, formerly of Seattle, Wash., has purchased a site at Eburne, B. C., on which to erect a shingle mill with four machines.

The Bridges Lumber Company is erecting a saw-mill on the Kootenay River west of Fort Steele, B. C., which will have a capacity of 45,000 ft. per day.

E. C. Knight, of the Vancouver Lumber Company, Vancouver, B. C., will erect a shingle mill at Roche Point, Burrard Inlet, B. C.

A by-law authorizing the expenditure of more than \$100,000 on the waterworks of Brandon, Manitoba, has been carried.

The Olympia Company, Ltd., Winnipeg, has taken out a permit for the erection of a nine-story office and store building this summer, at a cost of about \$400,000. J. Chisolm & Son are the architects.

A by-law providing \$320,000 for power plant extension and another providing \$30,000 for an incinerator plant have been carried in Calgary, Alberta.

A by-law providing \$63,000 for waterworks and \$25,000 for electric system has been carried in Kam-sack, Sask.

An election will shortly be held to vote \$100,000 bonds to improve the waterworks at Coquitlam, B. C.

The construction of the first building for the plant of the Medicine Hat Concrete Products Company has been started. The products of the company will be cement brick, blocks and ornamental work. J. Hollingshead is president and J. L. Peard is manager. The company has a capital of \$50,000.

The electors of Carman, Man., have voted on a by-law to exempt from taxation to the extent of 90 per cent. the property of the Canada Tile & Fireproofing Company. The property includes 24 acres of land. The building excavations have been started and the factory will be in operation by September 1.

The Canadian Stewart Company, contractor for the starch works of the A. M. Nanton Company, are rushing work on the buildings and the dock at Fort William, Ont. The plant will comprise 12 buildings and an elevator, to cost \$500,000.

It is announced on good authority that the Canadian Northern Railroad is considering the erection of terminal shops at Calgary, Alberta. The shops will be used for all repairs of rolling stock west of Saskatoon, Sask.

An industry which will be of value to Port Moody, B. C., if the City Council can offer it a site at a reasonable figure, is likely to be established there by the Canadian Zinc Company, a stock company which is in process of formation, supported by Vancouver and outside capital. This is the statement of Newton W. Emmers, who is promoting the company, which will operate a zinc smelter.

According to by-laws adopted, \$70,000 more will be spent by Watrous, Sask., in the completion of a water-works and sewerage system.

Government Purchases

WASHINGTON, D. C., June 5, 1913.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until June 17, schedule 5546, for a boring and wiring press, for the Norfolk navy yard; until June 24, schedule 5563, for a motor-driven emery grinder and for a web cylinder grinder, for the Norfolk navy yard, and schedule 5555, for vertical simplex feed pumps, for the Brooklyn navy yard.

The supervising architect of the Treasury Department, Washington, will receive bids until June 16 for a hoistway, freight elevator, etc., for the Chicago post office; until June 17 for two electric passenger elevators, etc., for the Philadelphia post office; until June 27 for a heating boiler, breeching, stack, etc., for the Asheville, N. C., post office.

The commissioners of the District of Columbia opened bids June 2 for one motor-driven lathe for use in the fire department as follows:

Fairbanks Company, Washington, D. C., \$1232; Aumen Machinery Company, Baltimore, Md., \$1130; Kemp Machinery Company, Baltimore, Md., \$1114; Alexander & Garsed, Charlotte, N. C., \$1320.

The purchasing agent, District of Columbia, opened bids for one direct-current, semi-inclosed, 5-hp. electric motor as follows:

C. & C. Electric & Mfg. Company, Philadelphia, Pa., \$312—time, 35 days; Diehl Mfg. Company, Washington, D. C., \$393—78 days; Western Electric Company, 463 West Street, New York City, \$304—60 days; Fairbanks, Morse & Co., 30 Church Street, New York City, \$325—30 days; National Electrical Supply Company, Washington, D. C., \$305—50 days; Standard Engineering Company, Washington, D. C., \$325—50 days; Sprague Electric Company, Baltimore, Md., \$336—60 days.

The Bureau of Supplies and Accounts, Navy Department, Washington, opened bids June 3 for supplies for the navy yards as follows:

Schedule 5416, Construction and Repair—Class 44, Brooklyn, for shipment to Pearl Harbor, Hawaii, 2 adjustable bar folders, 1 slip roll former, 1 wiring machine, etc.—Bid 94, \$430.78; 95, \$392.77; 96, \$477.27; 227, \$422.41.

Class 45—Bid 65, \$1680, part, and 1232, alternate.

Schedule 5417, Construction and Repair—Class 46, Brooklyn, reversible and non-reversible pneumatic drilling machines and pneumatic drilling machines—Bid 35, \$3865; 98, \$3565; 101, \$3389.

Class 47, Brooklyn, eight pneumatic wood-boring machines—Bid 35, \$450; 98, \$358; 101, \$372.

Class 48, Brooklyn, eighty pneumatic scaling hammers—Bid 35, \$16; 98, \$15; 101, \$20.

Class 49, Brooklyn, seventeen pneumatic hammers—Bid 35, \$357; 98, \$306; 101, \$374.

Class 50, Brooklyn, twenty-three pneumatic hammers and two pneumatic bottom riveter frames—Bid 35, \$913; 98, \$690, part; 101, \$632.50.

Class 51, Brooklyn, two pneumatic jam riveters—Bid 35, \$250; 98, \$200.

Class 52, Brooklyn, five short and three long pneumatic holders—Bid 35, \$128; 98, \$200; 101, \$128.

Schedule 5418, Construction and Repair—Class 54, Pearl Harbor, Hawaii, one bandsaw sharpener, one bandsaw stretcher and one combination rip and crosscut circular saw sharpener, etc.—Bid 20, \$800.50; 93, \$744.06; 96, \$793.50; 115, \$735.75; 118, \$996.91; 160, \$455.

Class 55, Pearl Harbor, one brazing table, one bandsaw filing clamp, one saw anvil, one leveling block, etc.—Bid 20, \$492.35; 68, \$21, part; 93, \$427.38; 96, \$487.35; 115, \$456.10; 118, \$397.13; 160, \$347.90.

Schedule 5420, Construction and Repair—Class 56, Pearl Harbor, for furnishing and installing a motor-driven shaving exhaust system in woodworking shop—Bid 9, \$9800; 157, \$12,208; 168, \$7584; 181, \$5580.

Schedule 5421, Construction and Repair—Class 57, Pearl Harbor, for furnishing and installing one oxy-hydric and acetylene equipment at naval prison—Bid 4, \$906.05, part; 77, \$7520.

Schedule 5423—Construction and Repair—Class 60, Pearl Harbor, one 3-ton 3-motor wall crane—Bid 132, \$3540.

Class 61, Pearl Harbor, one 10-ton 3-motor electric revolving crane—Bid 132, \$8300.

Class 62, Pearl Harbor, two 3-ton, 1-motor electric revolving pillar cranes—Bid 132, \$2270.

Schedule 5424, Construction and Repair—Class 63, Pearl Harbor, one 350-lb. single-frame steam hammer—Bid 16, \$678.30; 57, \$760; 115, \$825; 132, \$609; 196, \$545; 229, \$673.

Class 64, Pearl Harbor, one 2500-lb. single-frame steam hammer—Bid 16, \$2975.38; 57, \$3050; 115, \$2800; 132, \$2479; 167, \$3100; 188, \$4650; 196, \$2190; 229, \$2812.

Class 65, Pearl Harbor, one 1100 lb. single-frame steam hammer—Bid 16, \$1345.46; 57, \$1650; 115, \$1450; 132, \$1220; 167, \$1375; 196, \$1045; 229, \$1389.

Class 66, Pearl Harbor, one 600-lb. single-frame steam hammer—Bid 16, \$857.57; 57, \$970; 115, \$1005; 132, \$784; 167, \$1035; 196, \$745; 229, \$931.

Schedule 5425, Construction and Repair—Class 67, Pearl Harbor, one No. 3 Universal wood trimmer and one No. 1 wood trimmer—Bid 96, \$258.75; 142, \$230.

Class 68, Pearl Harbor, one door and sash clamp—Bid 68, \$408.54; 74, \$264.72; 135, \$198.

Class 69, Pearl Harbor, one 500-ton high-speed steam hydraulic forging press—Bid 15, \$14,475; 33, \$14,850; 188, \$22,780.

Schedule 5426, Construction and Repair—Class 70, Pearl Harbor, one slitting shear and one combined wire straightener and cutter—Bid 96, \$162; 115, \$75; 143, \$85.

Class 71, Pearl Harbor, jib cranes and spur-gear chain hoists—Bid 33, units, part; 36, informal; 39, \$539; 71, \$937; 94, \$1555.35; 131, \$1585 and \$1283, alternate; 184, \$2396.50.

Schedule 5433, Construction and Repair—Class 111, Pearl Harbor, one right-hand timber resaw—Bid 118, \$3877.05 and \$4150.05.

Class 112, Pearl Harbor, one 38-in. right-hand band sawing machine—Bid 6, \$428.89; 68, \$540 and \$451.94, alternate; 69, \$488; 96, \$373.75; 115, \$713 or \$373, alternate; 140, \$472 and \$500, alternate; 142, \$628; 158, \$750.

Class 113, Pearl Harbor, two automatic railway cutting-off saws—Bid 6, \$820.45; 68, \$599.49; 74, \$435.63; 96, \$385; 115, \$444 or \$455, alternate; 220, \$579.75.

Class 114, Pearl Harbor, three Universal saw benches—Bid 6, \$1603.97; 68, \$587.52; 69, \$547; 74, \$568.60 and \$547.73, alternate; 96, \$575 and \$697, alternate; 115, \$566 or \$586; 140, \$536; 142, \$575; 185, \$539.

Class 115, Pearl Harbor, one woodworking turning lathe—Bid 6, \$811.88; 68, \$874.50; 142, \$805.

Class 116, Pearl Harbor, one combined carving and molding machine—Bid 68, \$664.13; 142, \$625.

Class 117, Pearl Harbor, three handplaners and jointers—Bid 6, \$1366.69; 25, \$1313.60; 68, \$1584.17; 69, \$920; 74, \$1460.12; 96, \$1351.50; 115, units; 142, \$2119; 185, \$615, part.

Class 118, Pearl Harbor, one hand planer and jointer—Bid 6, \$193.69; 68, \$299; 96, \$294.25; 115, \$165; 142, \$199.

Class 119, Pearl Harbor, one self-feeding rip saw—Bid 6, \$783.15; 25, \$650.64; 68, \$711.15 and \$381.81, alternate; 74, \$668.45; 96, \$717 and \$600, alternate; 115, \$697 or \$587; 135, \$382.10; 142, \$656; 166, \$755.

Class 120, Pearl Harbor, one vertical column sash and door sander—Bid 6, \$375.62; 68, \$362.37 and \$336.12, alternate.

Class 121, Pearl Harbor, one double-spindle motor-driven shaper—Bid 3, \$499.41; 6, \$412.48; 25, \$466.70; 68, \$573.91 and \$506.41, alternate; 69, \$486; 96, \$370.50; 115, \$542 and \$440; 158, \$630; 166, \$556; 220, \$974.29.

Class 122, Pearl Harbor, one self-feeding rip saw—Bid 6, \$841.42; 25, \$730.37; 68, \$720.22; 74, \$783.59; 96, \$717; 115, \$815 and \$693; 166, \$877.

Class 123—Bid 6, \$751.56; 25, \$702.80; 68, \$417.06 and \$431.46, alternate; 69, \$366; 96, \$357 and \$216, alternate; 115, \$356; 140, \$355, \$340 and \$383; 142, \$409; 158, \$600; 166, \$483.

Class 124, Pearl Harbor, one reciprocating mortising machine—Bid 6, \$411.29; 68, \$502.75; 74, \$620.41 and \$588.47, alternate; 96, \$477; 115, \$652, \$622, \$642 and \$612; 166, \$633.

Class 125, Pearl Harbor, one tenoning machine—Bid 6, \$738.46; 25, \$560.30; 68, \$509.88; 74, \$572.95, \$482; 115, \$600, \$588 and \$460; 135, \$469.20; 166, \$644.

Class 126, Pearl Harbor, one jig saw—Bid 6, \$199.27; 25, \$322.20; 68, \$255.50; 96, \$235; 115, \$185 and \$226; 142, \$226; 158, \$390; 166, \$304.

Class 127, Pearl Harbor, one wood-boring machine—Bid 6, \$338.58; 68, \$210.23; 69, \$371; 74, \$209.92; 96, \$296; 115, \$220 and \$373; 140, \$341; 158, \$455; 166, \$351.

Class 128, Pearl Harbor, one heavy automatic hollow chisel mortiser—Bid 68, \$1498.34 and \$1869.72; 69, \$1127; 74, \$1688.78, \$2025.50 and \$1584.43; 96, \$1705; 115, \$1760, \$1620, \$1684, \$2049, \$1910, \$1974, \$1058, \$1519 and \$1583; 220, \$2055.77.

Class 129, Pearl Harbor, one automatic plug machine—Bid 68, \$274.63; 158, \$2130; 220, \$842.83.

Class 130, Pearl Harbor, one dimension planer—Bid 25, \$2541.82; 68, \$2578.86; 115, \$2376, \$2308 and \$2252; 220, \$2894.58.

Class 131, Pearl Harbor, one planer and matcher—Bid 6, \$4395.22; 25, \$3975.80; 68, \$3397.29; 135, \$3527.20; 220, \$3900.83.

Class 132, Pearl Harbor, one left-hand band self-feeding ripping and resawing machine—Bid 6, \$995.63; 25, \$1401.79; 68, \$1288.33.

Class 133, Pearl Harbor, two revolving oilstone universal tool grinders—Bid 142, \$275.

Class 134, Pearl Harbor, one automatic railway cutting-off saw, motor driven—Bid 68, \$1137; 74, \$1192.60, \$1178.81, alternate, and \$1233; 96, \$963.50; 115, \$1178, \$1070, \$1228, \$1120; 220, \$1235.21.

Class 135, Pearl Harbor, one timber sizer—Bid 6, \$3733.75; 25, \$4242.60; 68, \$4090.66 and \$3530.24, alternate; 220, \$4385.80.

Class 136, Pearl Harbor, two 9-in. outside molding machines—Bid 6, \$2299.41; 25, \$3804.60; 68, \$1107.64; 74, \$1847.23 and \$1802.79, alternate; 115, \$2004 and \$1912; 135, \$1190; 166, \$1713; 220, \$1508.34.

Class 137, Pearl Harbor, one automatic knife grinder—Bid 6, \$529.70; 20, \$440; 25, \$542.20; 68, \$501.04; 96, \$480; 115, \$239; 118, \$404.80, \$239.80, \$504.50 and \$411.20; 140, \$525; 142, \$636; 220, \$589.71.

Class 138, Pearl Harbor, two single surfacers—Bid 6, \$2545.82; 25, \$2790.72; 68, \$1186.20; 96, \$1040 and \$1060, alternate; 115, \$1392; 142, \$830; 166, \$1598; 197, \$1475; 220, \$1368.60 and \$1368.60, alternate.

Class 139, Pearl Harbor, one single surfacer, motor driven—Bid 6, \$1320.41; 25, \$1320.36; 68, \$1186.20; 69, \$1127; 96, \$1060; 115, \$1392; 142, \$830; 166, \$1598; 197, \$1475; 220, \$1368.60.

Class 140, Pearl Harbor, one portable deck planer—Bid 115, \$558.

Class 141, Pearl Harbor, one adjustable dowel and rod machine—Bid 6, \$691.64; 68, \$801.69; 90, \$595; 115, \$925; 185, \$395.

Class 142, Pearl Harbor, one squaring shears—Bid 78, \$2170.55; 96, \$1259; 140, \$1460.46; 143, \$1460; 173, \$1680; 229, \$1658.

Class 143, Pearl Harbor, one circular and splitting shears—Bid 96, \$882.50; 140, \$797.79; 143, \$797.79; 173, \$1180; 178, \$2200.

Class 144, Pearl Harbor, one wire crimper—Bid 140, \$926.76; 143, \$926.76.

Class 145, Pearl Harbor, one slip roll-forming machine—Bid 140, \$1100; 143, \$1100.

Class 146, Pearl Harbor, one plate-splitting shear—Bid 15, \$8450; 78, \$1988.25; 82, 2035 and \$1985, alternate; 115, \$1395; 132, \$1590; 140, \$1875; 146, \$1650; 198, \$2180; 202, \$2134; 229, \$1734.

Class 147, Pearl Harbor, one bar iron shear—Bid 15, \$6200; 78, \$3213; 82, \$2839 and \$2889, alternate; 94, \$1987; 115, \$2925, \$3268 and \$3455; 132, \$2800; 198, \$2690 and \$3430; 202, \$2047; 206, \$3480.

Class 148, Pearl Harbor, one high-speed power hacksaw machine—Bid 52, \$197.45; 96, \$199; 115, \$241, \$310 and \$202.

Class 149, Pearl Harbor, one angle iron shear, mounted on turntable—Bid 78, \$3084.75; 82, \$2869; 94, \$2187; 96, \$4827; 132, \$2580; 198, \$4405; 202, \$2737; 206, \$2685.

Class 150, Pearl Harbor, one motor-driven cushioned helve hammer—Bid 64, \$695; 96, \$574; 115, \$887, \$593 and \$1117; 229, \$918.

Class 151, Pearl Harbor, one 1/4-in. continuous-motion bolt and rivet-making machine—Bid 8, \$4816; 115, \$4900 and \$5004.

Class 152, Pearl Harbor, one 3-inch upsetting, heading and forging machine—Bid 8, \$5000; 115, \$5302 and \$5378.

Class 153, Pearl Harbor, two floor grinders, double-wheel—Bid 96, \$235; 115, \$237.75; 140, \$360 and \$365, alternate.

Class 154, Pearl Harbor, one 2 1/2-in. swing upright drilling machine—Bid 96, \$288.50; 115, \$277; 140, \$150; 229, \$275.

Class 155, Pearl Harbor, one combination punch, shear and bar cropper—Bid 146, \$1040; 177, \$1443; 198, \$750.

Class 156, Pearl Harbor, one single-ended convertible punch and shear—Bid 78, \$2232.10; 82, \$2499 and \$2447, alternate; 94, \$1873; 115, \$2920 and \$2875; 132, \$2445; 198, \$2530; 202, \$1924; 206, \$2830.

Class 157, Pearl Harbor, one single-ended convertible punch and shear—Bid 78, \$2877.10; 82, \$4019 and \$3967, alternate; 115, \$4975 and \$4915; 132, \$4723; 202, \$2949.

Class 158, Pearl Harbor, one single-ended convertible punch and shear—Bid 78, \$2130.65; 82, \$3450 and \$3400; 115, \$3420 and \$3425; 132, \$3393; 202, \$2145.

Class 159—Bid 78, \$1844.65; 82, \$2695 and \$2645, alternate; 115, \$2820 and \$2825; 132, \$2307; 202, \$1848.

Class 160, one single-ended architectural jaw punch—Bid 78, \$928.40; 82, \$800 and \$760, alternate; 94, \$501; 115, \$679 and \$699; 132, \$658; 140, \$755; 198, \$485; 202, \$1039; 206, \$990; 229, \$728.

Class 161, Pearl Harbor, one horizontal punch, motor-driven—Bid 82, \$1265; 94, \$1012; 115, \$1029 and \$1128; 132, \$1038, 140, \$1195; 198, \$1670; 202, \$1388; 229, \$1139.

Class 162, Pearl Harbor, one horizontal punch, motor-driven—Bid 15, \$13,000; 82, \$5625; 132, \$6050; 167, \$8500.

Class 163, Pearl Harbor, one plate-edge planing machine—Bid 15, \$5000; 82, \$4765 and \$3800, alternate; 94, \$4380; 96, \$4675; 132, \$4545; 202, \$3657.

Class 164, Pearl Harbor, one set plate straightening rolls—Bid 82, \$5900; 94, \$5493; 96, \$6985; 132, \$6225; 202, \$5600.

Class 165, Pearl Harbor, one set plate bending and flanging rolls—Bid 15, \$19,900 and \$22,200, alternate; 82, \$14,450; 132, \$17,110; 202, \$12,212.

Class 166, Pearl Harbor, one 20-in. swing upright drilling machine—Bid 96, \$205.75; 115, \$196; 140, \$225; 229, \$209.

Class 167, Pearl Harbor, one horizontal bending and straightening machine—Bid 15, \$3225; 82, \$1325; 115, \$1428 and \$1450; 132, \$1490; 202, \$1839; 206, \$1880.

Class 168, Pearl Harbor, one 2-spindle gang drill—Bid 96, \$497.25; 115, \$459; 140, \$468.

Class 169, Pearl Harbor, one motor-driven 8-ft. double-cam cornice brake—Bid 96, \$757; 115, \$1035; 140, \$825.

Class 170, Pearl Harbor, one radial countersinking machine—Bid 115, \$625.

Class 171, Pearl Harbor, one combination radial plate drilling and countersinking machine—Bid 67, \$7298.

Class 172, Pearl Harbor, one 3-ft. gang punch and brake—Bid 78, \$1556.40; 140, \$1277.55; 143, \$1277.55.

Schedule 5439, Navigation—Class 201, Annapolis, one single cabinet surfacer—Bid 10, \$904.90; 25, \$1023.25; 68, \$937.50; 96, \$758.50; 115, \$1174 and \$1183; 142, \$790; 197, \$983 and \$1083, alternate.

Class 202, Annapolis, one revolving oil-stone universal grinder—Bid 142, \$260.

Schedule 5441, Steam Engineering—Class 212, Brooklyn, one boring and turning mill—Bid 15, \$83,960; 132, \$59,845; 167, \$67,750; 198, \$58,820.

Following is a list of the bidders, whose numbers are found with the bids given above:

4. The Alex. Milburn Company, 1424 West Baltimore street, Baltimore, Md.
6. American Woodworking Machinery Company, Rochester, N. Y.
8. Ajax Mfg. Company, 3830 Lakeside avenue, Cleveland, Ohio.
9. Allington & Curtis Mfg. Company, Saginaw, Mich.
10. Ammen Machinery Company, 170 East Lombard street, Baltimore, Md.
15. Bethlehem Steel Company, South Bethlehem, Pa.
16. Buffalo Foundry & Machine Company, Buffalo, N. Y.
20. Baldwin, Tuthill & Bolton, Grand Rapids, Mich.
25. Berlin Machine Works, Beloit, Wis.
33. Camden Iron Works, Camden, N. J.
35. Chicago Pneumatic Tool Company, 50 Church street, New York City.
36. Chisholm & Moore Mfg. Company, Cleveland, Ohio. Informal: No Form A.
39. Curtis & Co. Mfg. Company, St. Louis, Mo.
52. Diamond Saw & Stamping Works, Buffalo, N. Y.
57. Erie Foundry Company, Erie, Pa.
64. Fairbanks Company, Washington, D. C.
65. Fore River Shipbuilding Company, Quincy, Mass.
67. Walter H. Foster Company, 50 Church street, New York City.
68. J. A. Fay & Egan Company, Cincinnati, Ohio.
69. Frevert Machinery Company, 38 Vesey street, New York City.
71. R. W. Geldart, 2 Stone street, New York City.
74. Greenlee Bros. & Co., Rockford, Ill.
77. Gulf Refining Company, Pittsburg, Pa.
78. Huntington Machine & Foundry Company, Huntington, Ind.
82. Hilles & Jones Company, Wilmington, Del.
90. W. S. Hawker Mfg. Company, Dayton, Ohio.
93. Hanchett Swage Works, Big Rapids, Mich.
94. Honolulu Iron Works, New York City.
95. Knox & Brothers, New York City.
96. Kemp Machinery Company, 223 North Calvert street, Baltimore, Md.
98. Ingersoll-Rand Company, 11 Broadway, New York City.
101. Independent Pneumatic Tool Company, Chicago, Ill.
109. La Ganda Mfg. Company, Springfield, Ohio.
115. Manning, Maxwell & Moore, 85 Liberty street, New York City.
116. Midvale Steel Company, Nicetown, Philadelphia, Pa.
118. Wm. B. Mershon & Co., Saginaw, Mich.
131. New Jersey Foundry & Machine Company, 90 West street, New York City.
132. Niles-Rement-Pond Company, 111 Broadway, New York City.
135. Newman Machine Company, Greensboro, N. C.
140. D. Nast Machinery Company, Bourse Bldg., Philadelphia, Pa.
142. Oliver Machinery Company, 50 Church street, New York City.
143. George A. Ohl & Co., Newark, N. J.
146. Henry Pels & Co., 90 West street, New York City.
157. Perine Machinery Company, Seattle, Wash.
158. Prybil Woodworking Machinery Company, 520 West Forty-first street, New York City.
160. Samuel C. Rogers & Co., 10 Lock street, Buffalo, N. Y.
166. H. B. Smith Machine Company, Smithville, N. J.
167. Wm. Sellers & Co., 1600 Hamilton street, Philadelphia, Pa.
168. B. F. Sturtevant Company, Hyde Park, Mass.
173. G. H. Stoll Company, Buffalo, N. Y.
177. The Schatz Mfg. Company, Poughkeepsie, N. Y.
178. H. C. Smith, 807 Scotten avenue, Detroit, Mich.
181. Sterling Blower Company, Hartford, Conn.
184. Terminal Machinery Company, Seattle, Wash.
185. The Tannetitz Works, Grand Rapids, Mich.
188. United Engineering & Foundry Company, Pittsburgh, Pa.
196. William H. Wood, Media, Pa.
197. Paxter D. Whitney & Son, Winchendon, Mass.
198. Wiener Machinery Company, 50 Church street, New York City.
202. Wickes Brothers, Saginaw, Mich.
206. Williams, White & Co., Moline, Ill.
220. S. A. Woods Machine Company, Boston, Mass.
229. Prentiss Tool & Supply Company, 149 Broadway, New York City.

